



NUTRITION FOUNDATION OF INDIA

# THE NATIONAL GOITRE CONTROL PROGRAMME

A blueprint for its intensification

Project funded by Ministry of Social Welfare  
Government of India

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SCIENTIFIC REPORT 1



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A blueprint for its intensification

(Project funded by the Ministry of Social Welfare, Government of India)



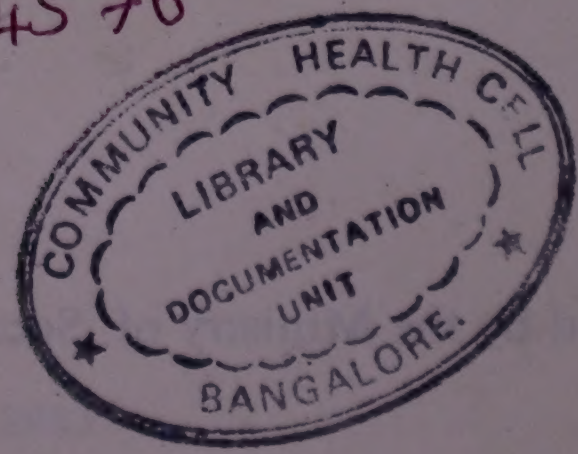
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A blueprint for its implementation

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# Contents

	Page
<b>1. The National Goitre Control Programme — A Blueprint for its Intensification</b>	
1.1 Introduction	7
1.2 The Goitre Problem	10
1.3 Involving the People and the States	12
1.4 Organisation and Management	15
1.5 Production of Iodised Salt	17
1.6 Parenteral Iodine Administration	21
1.7 Packaging, Transport and Distribution	22
1.8 Monitoring, Evaluation and Research	24
<b>2. Current status of the National Goitre Control Programme</b>	
Report submitted to the Nutrition Foundation of India by Dr. K.N. Agarwal and Dr. (Ms) D.K. Agarwal	
2.1 Preface	29
2.2 Introduction	30
2.3 Report on Visits to Endemic States	
2.3.1 Uttar Pradesh	33
2.3.2 Himachal Pradesh	36
2.3.3 Jammu & Kashmir	39
2.3.4 Gujarat (Bharuch)	40
2.3.5 West Bengal	43
2.3.6 Assam	43
2.3.7 Nagaland	44
2.3.8 Manipur	45
2.3.9 Bihar (Champaran)	46
2.4 Iodised Salt in India — its Availability	48
<b>3. The National Goitre Control Programme — A Sad Story</b>	
by Dr. C. Gopalan	55







# **1. THE NATIONAL GOITRE CONTROL PROGRAMME**

**A Blueprint For Its Intensification**







## 1.1 Introduction

In its July 1981 issue, the Bulletin of the Nutrition Foundation of India carried an account of the current status of the National Goitre Control Programme (*The National Goitre Control Programme — A Sad Story*: C. Gopalan. Bull. N.F.I., July 1981). This account attracted considerable attention from the public, press and parliament. The Union Ministry of Health, on the basis of the successive reports of its Nutrition Adviser was already seriously concerned over the poor progress of the Goitre Control Programme in different States. The Ministry of Social Welfare was poised to extend its Integrated Child Development Services (I.C.D.S.) programme; several blocks which were to be included in this expansion fell within the endemic goitre region; the Ministry was therefore also keen to have before it, practical suggestions for future action with respect to Goitre control. The Ministry of Social Welfare (the nodal Ministry for Nutrition) commissioned the Nutrition Foundation of India to undertake a rapid evaluation of the current status of the National Goitre Control Programme, and, on the basis of these data, to provide to the Government of India, a blueprint for the intensification of the National Goitre Control Programme. The Foundation was glad to respond to this opportunity for constructive service with respect to a major national nutritional problem.

In order to have an unbiased assessment from competent scientists, unconnected with the implementation of the Programme, the Foundation requested and obtained the expert services of Dr. K. N. Agarwal, Professor of Paediatrics, Institute of Medical Sciences, Banaras Hindu University and Dr. (Ms) D. K. Agarwal, Associate Professor of Preventive & Social Medicine from the same Institute. After detailed discussions, their study design was finalised. On the basis of the programme decided upon, these scientists visited the different endemic States for detailed discussions with officers and agencies concerned with the implementation of the programme; they

also carried out their own independent studies and collected data pertaining to the goitre problem. They presented to the Foundation a detailed Report of their discussions, observations and recommendations.

On behalf of the Foundation, I also had the benefit of separate detailed discussions with a large number of senior officers representing different agencies/departments of the Government, singly and collectively. Special mention must be made of the valuable help received from Dr. P. C. Sen, Nutrition Adviser, Health Ministry, thanks to the cooperation and support extended by the Additional Secretary in the Ministry, Mr. C. V. S. Mani. Among the others, I would like to gratefully acknowledge the valuable suggestions from UNICEF (Mr. Dalal), from the Secretary and Additional Secretary of the Ministry of Industries; the Salt Commissioner; the Hindustan Salts Limited; the Director-General, Council of Scientific and Industrial Research; the Director, Central Marine Research Institute, Bhavanagar; the Planning Commission; senior officers of the Ministry of Civil Supplies; and the Chairman, Consumer Cooperatives. I am grateful to the Secretary, Ministry of Industries, who was kind enough to arrange for a special meeting in which I could jointly discuss the programme with the Department of Industries, Salt Commissioner and the Director, Hindustan Salts Limited; and to the Director-General, C.S.I.R. who arranged for a special discussion on the submersion process at a meeting in which representatives of the Salt Commissioner, Hindustan Salts, Health Ministry, UNICEF and the Bhavnagar Central Marine Research Institute were present.

It is not the purpose of this Report to describe in detail the magnitude and implications of the Goitre problem. We have also not dwelt too much on past errors in the conduct of this Programme. The emphasis here is on future action to be undertaken in the light of past experience.



This Report carries the official recommendations of the Foundation — the Foundation's blueprint for the intensification of the National Goitre Control Programme. These recommendations are discussed and presented under the following heads in the next few pages: (1) The Goitre problem; (2) Involving the people and the States; (3) Organisation and management; (4) Production of iodised salt; (5) Packaging, transport and distribution of iodised salt; (6) Parenteral iodine administration; (7) Monitoring, Evaluation and Research. These recommendations are partly based on the Report by Dr. K. N. Agarwal and Dr. (Ms) D. K. Agarwal, who had studied the problem at the grass-root level with great diligence and care, and partly on the several suggestions and viewpoints expressed in the course of my many discussions with the officers and agencies mentioned above.

The detailed Report furnished by Prof. K. N. Agarwal and Dr. (Ms) D. K. Agarwal to the Foundation is presented separately, in an abridged form. The paper on "The National Goitre Control Programme — a sad story" which triggered off this exercise, has also been appended.

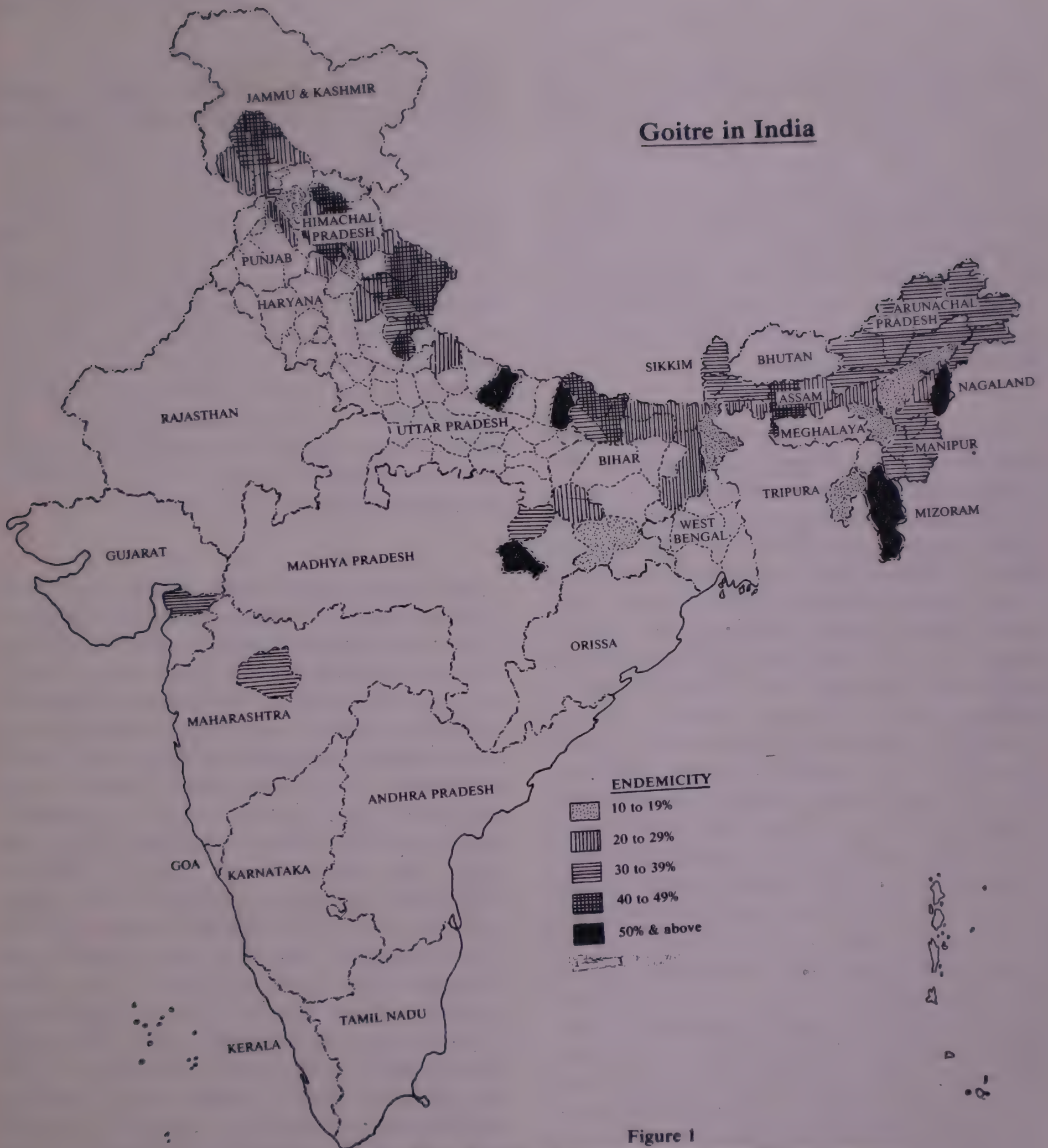
On behalf of the Foundation, I thank Mrs. Serla Grewal, former Secretary, Ministry of Social Welfare, but for whose dynamism and vision, this work could not have been undertaken. The Foundation looks upon this effort as a small example of the type of constructive "partnership for progress and National Development" which voluntary Agencies and Government Agencies should forge, in increasing measure in the years ahead.

*C. Gopalan*

*President, Nutrition Foundation of India*



## Goitre in India



**Figure 1**  
**Map showing goitre-endemic areas in the country**

Source: Ministry of Health, Government of India.

Since no systematic nation-wide survey of goitre has been undertaken, it cannot be presumed that goitre is strictly confined to the areas indicated.



## 1.2 The Goitre Problem

Though earlier estimates had indicated that the population exposed to endemic goitre in our country may be about 120 million, the identification of new endemic areas in subsequent years suggests that our earlier assessments were probably underestimates, and that the real figure may well exceed 170 million. We must also allow for the inevitable growth of the population. Thus by 2000 A.D., the total population that may have to be protected against goitre in our country may well be around 200 million.

It is not merely these vast numbers that should cause anxiety; the emerging new evidence with regard to the far-reaching functional implications of the disease should arouse even greater concern. Recent studies from the All India Institute of Medical Sciences based on nearly 12,000 cord blood samples obtained from endemic goitre areas showed evidence of thyroid hormonal deficiency in 3% of the offspring. Apparently the mothers in this study were not all necessarily suffering from clinical goitre. Studies carried out by Prof. K. N. Agarwal and Dr. (Ms) D. K. Agarwal on behalf of the Nutrition Foundation of India showed a lag in mental development in children of goitrous mothers, though these children were not actually suffering from clinical cretinism. These studies indicate that the effects of clinical (or even sub-clinical goitre) in the mothers living in the endemic goitre zones, on the physical and mental development of their offspring are perhaps much more serious, insidious and extensive than what we had earlier imagined from the available data on prevalence of cretinism and deaf-mutism in these areas. Thus, goitre, both from the point of view of numbers involved and of its implications to physical and mental development of children is a major health problem of our country requiring urgent attention.

The technology for goitre control is well established and has been successfully applied in several countries, resulting in the total eradi-

cation of goitre from those countries several decades ago. This technology is well within our national competence and does not need foreign expertise. The financial inputs needed are insignificant compared to the enormous expenditure incurred on many other programmes. Also, the eradication of goitre can be achieved even under the present socio-economic circumstances. We need not wait for the eradication of poverty or for substantial improvement in the socio-economic conditions of our people before we can hope for success in the control of goitre. All that is really needed is intersectoral coordination, efficient management and above all genuine concern and compassion for the poor, on the part of those in positions of power and authority.

A word of caution is perhaps necessary. Goitre control cannot be achieved through a massive once-and-for-all operation-like the eradication of small-pox. Goitre control, like malaria control, will call for continued and sustained vigilance, and there can be no slackening of efforts after the initial enthusiasm wanes. Our country has always excelled in "crisis management"; where it has frequently failed is with respect to operations which demand sustained tempo and continuous vigil. The sad experience with the Malaria Eradication Programme, where we had almost reached the point of complete success and then allowed things to slide, is a tragic example of this weakness. The National Goitre Control Programme was not conceived of, and implemented, as a well-integrated, comprehensive and coordinated attack on the disease. It was always a half-hearted, weak, highly fragmented and compartmentalised operation with no unified command, and with each department concerned guarding zealously its own little empire, and each blaming the other for the shortcomings. Even the semblance of coordination forged initially between the different departments at the Centre, and between the Centre and the concerned States progressively slackened and finally fell apart with



the passage of time — a process facilitated by lack of public awareness and cooperation, and lack of political will at all levels.

The slogan 'Health For All by 2000 A.D.' is now being voiced everywhere and India has also officially joined the chorus. If there is one disease,

more than any other, which lends itself easily to total eradication within the next two decades, it is goitre. In fact, goitre is a very simple test of our professions in the Health field; and having set for ourselves the ambitious goal of Health for all by 2000 A.D., we just cannot afford to fail in this simple test.



### 1.3 Involving the People and the States

In all discussions of the National Goitre Control Programme, major attention has been devoted to the mechanics of production and distribution of iodised salt. The tacit assumption has been that if only the logistic and administrative problems connected with the production and distribution of iodised salt are taken care of, the programme can be successfully imposed on the people from above. In the final result it is not that these problems connected with production and distribution of iodised salt have been successfully solved. The failure to do so — and indeed the failure of the National Goitre Control Programme as a whole — is largely attributable to the central fact that the need to generate awareness of the importance and implications of the goitre problem among the public in the endemic States, has been almost totally lost sight of. No public health programme can really succeed unless the people are totally involved, and perceive the programme as beneficial and necessary for their health and well-being.

The glaring fact is that the public in the endemic States, at present, do *not* perceive goitre as a health problem; they are not aware of its implications on their productivity and well-being, and on the mental development of their children. The connection between goitre (the neck-swelling) and iodised salt is largely unknown, nor the connection between goitre in the mother during pregnancy and cretinism and mental backwardness of her offspring. With such public ignorance, and in the absence of public vigilance, it is not surprising that agencies connected with production and distribution of iodised salt have been able to get away with all the shortcomings — arising from apathy, inefficiency and corruption — which have nearly wrecked the programme.

Perhaps, the major blame for this state of affairs has to be laid at the door of the State  
12 Health Agencies. The Health Agencies in most of

the endemic States do not themselves perceive goitre as an important problem of their State. Indeed the process of education must start with public health personnel including the doctors. Doctors in charge of PHCs in the endemic States, when specifically questioned, do *not* list goitre as a major health problem; they were themselves using uniodised salt (the entry of which into the State was supposed to be prohibited by law); lady health visitors themselves suffering from goitre were totally unaware of its implications and of the role iodised salt could play in its correction, and of any connection between goitre in the mother and mental backwardness in her child. Obviously information on these aspects did not form part of their training! There was therefore no question of any health education of the public on goitre and on their need to use iodised salt, by these health functionaries at the domiciliary or at the health-centre levels. In short, the State health agencies have been almost totally uninvolved in — and indeed unconcerned with — the national goitre control programme.

Under the circumstances, the lone Nutrition Officer located at the Union Health Ministry and his inadequately staffed "goitre cell", received little support from the State Health Agencies even in the matter of conduct of routine goitre surveys, let alone implementation of the Programme. The data indicating failure of the programme which were glaring in his several reports, were just routinely filed and made no significant dent on the course of the so-called 'goitre-control operations'.

With the State Health Agencies largely unconcerned, the State Civil Supplies departments were also not vigilant, their "salt nominees" (politically influential) were free to bring in and distribute iodised or uniodised salt and there was no effective check and no quality control. In fact, more uniodised salt than iodised salt reached



many of the endemic States. Thus, we understand that in Mizoram, an endemic goitre State, practically all the salt available was uniodised salt. In any case, the entry of uniodised salt into the endemic States could not have been prohibited without creating a 'salt famine', for the reason that the present total installed capacity of the iodisation plants is highly inadequate to meet their minimum needs; and furthermore, the existing plants are working well below their installed capacity. It would appear that, by and large, most of the endemic States were in effect largely unconcerned with, and uninvolved in, the National Goitre Control Programme — which they perhaps perceived as a purely "Central" operation, of not much vital importance to the State, and therefore not one over which they felt it necessary to expend significant resources or administrative control. There is no officer of significant status in most of the endemic States entrusted with the responsibility for implementing the Programme — Goitre is thus nobody's business. The very fact that the Governments of the endemic States are still unwilling to share even a small part of the expenses incurred at the Central level in the Goitre Control Programme in their States, and that they have to be coaxed and cajoled to provide facilities for plants to be installed at Central expense (note the glaring example of the iodisation plants provided for Assam by the Centre which have failed to take off even after two years of negotiation) — bear ample testimony to their apathy, born out of lack of awareness of the importance of the goitre problem at all levels of the concerned State Governments.

Before we concern ourselves with the mechanics of production and distribution of iodised salt, we must address ourselves to this major factor responsible for the current failure of the National Goitre Control Programme — public ignorance, ignorance and apathy of the Health Agencies of many of the endemic States, the consequent non-involvement of the State administration as a whole, in most of the endemic States, and the lack of coordinating machinery of sufficient authority for implementation, monitoring and enforcement of the programme both at the Central and State levels.

In order to remedy the situation, we recommend the following:

(1) The Central Health Education Bureau, in consultation with the Nutrition Officer of the Union Health Ministry, and with the cooperation of the State Health Agencies, and with the involvement of the media, must immediately initiate an imaginative and intensive educational programme beamed to the public of the endemic States, designed to highlight the importance and implications of the Goitre problem and of the need to ensure the intake of iodised salt by the public. This mass-educational programme must be organised and maintained with continuous tempo. It should not be a short-lived spasmodic operation.

(2) The training programme of the auxiliary health personnel in the endemic States must be specially structured in order to provide focus on the goitre problem and on the need to ensure the use of iodised salt by the people.

(3) Special focus on the goitre problem in the training of anganwadi workers and other personnel of the ICDS programmes operating the goitrous States must be provided. Anganwadi workers, like the health-visitors, in the 'regular' health infrastructure must be instructed to educate the mothers and families on the importance of the goitre problem and ensure the use of iodised salt in the homes they visit; they must also bring samples of salt used in different homes for testing at the local medical college or public health laboratory, where testing facilities will be provided.

(4) Now that the ICDS programme is being expanded to a number of blocks which are goitre-endemic, the programme can contribute to the goitre control programme in the following ways: (a) ensure that in the preparation of all foods used for the supplementary feeding programmes covering pregnant women as well as children, only iodised salt is used. The Child Development Officer (C.D.P.O.) may place orders to cover his requirements of iodised salt for this



purpose, with the State Department of Civil Supplies well in advance; (b) educate families on the need to use iodised salt in their home dietaries; (c) help the health agency in monitoring the use of iodised salt.

(5) Uniodised salt being sold with the spurious label as iodised salt should be identified and both the health workers and anganwadi workers should bring this to the notice of the authorities.

(6) Periodical seminars and group discussions must be organised at the All India Institute of Medical Sciences for Senior Health administrators and health officials from the endemic States in order to make them fully aware of the importance and implication of the goitre problem and of the latest findings with regard to the magnitude of the problem of mental backwardness in children in goitrous areas.

(7) Seminars at State levels involving the senior administrators drawn from the Health & Civil Supplies Departments, journalists and public men, must be organised in order to focus attention on the importance of the problem from the point of view of the State. In all these exercises, the point that goitre may not be dramatic in its manifestation but nevertheless is far-reaching in its implications, must be brought home.

(8) The active involvement of the medical colleges of the State (through their Preventive Medicine Departments) in monitoring the goitre prevalence, and (of their biochemistry departments) in frequent checks of iodine levels in random salt samples obtained from the markets and the homes (through the help of health visitors during their visits) must be encouraged. These

checks may not be for punitive purposes but for providing the feed-back with regard to the actual use of iodised salt to the Civil Supplies Departments which are responsible for ensuring distribution of adequate supplies of iodised salt.

(9) Departments of Paediatrics and Endocrinology in the medical colleges of the endemic States should be encouraged to carry out studies of the type which Dr. Kochupullai and his group in the All India Institute of Medical Sciences and Dr. K. N. Agarwal and his group in the Institute of Medical Sciences, Banaras Hindu University have done in order to assess the true magnitude and the implications of goitre with respect to physical and mental development of the children. Such studies will serve to highlight the far-reaching implications of the goitre problem and to dispel the current apparent indifference of State Health Agencies towards this problem.

(10) A lesson on goitre, explaining its causation, possible harmful effects, and how it could be prevented by the use of iodised salt must be included compulsorily in school text-books used by school-children in all the endemic States.

(11) Special orientation programmes for school-teachers must be organised by the State Health Directorates with the help of the Central Health Education Bureau in order to make the teachers aware of the problem and to enable them to detect goitre in their children and to report this to the health personnel.

Goitre control must become a people's movement and a situation must be created in which the State Agencies must press the Centre for support in implementing the control programme, thus reversing the present position in which it is the Centre which has to plead (often ineffectively) with the endemic States.



## 1.4 Organisation and Management

A major weakness in the current set-up is that there is no Agency of sufficient authority at the Central and State level, which could take a total inter-sectoral view of the whole chain of operations involved in goitre control and also ensure close Centre-State participation. Though goitre is a health problem, the goitre-control programme involves the Ministry of Industry, Salt Commissioner, Hindustan Salts, private salt manufacturers, Railways, Health departments and Civil Supplies departments of different States, and the Planning Commission. The Nutrition Adviser in the Union Health Ministry, though trying hard to do a frustrating job, is unfortunately an officer low in the hierarchy of the Health Ministry itself, and does not therefore command the necessary administrative authority. His under-staffed Goitre cell, often denied the active cooperation of the State Health departments, cannot obviously accomplish much more than produce periodic reports of the current status of goitre prevalence. The Health Ministry also apparently finds itself unable to rectify the factors underlying the current failure of the programme, for the action needed pertains to departments and institutes outside of its jurisdiction. What is urgently needed under the circumstances is the creation of an organisational set-up of sufficient authority and stature, with powers to take decisions and implement them with respect to the entire chain of operations involved in Goitre control. We recommend the following steps:-

(1) A National Goitre Control Board should be immediately set up with the Union Health Minister as chairman, and the Secretaries of Health, Social Welfare, Industries, Civil Supplies, Finance, representatives of the Planning Commission and of the Railway Board and the Salt Commissioner, as its members and the Commissioner for Goitre Control (see 2 below) as member-secretary. The Board should, through an appropriate Government order, be vested with the authority of an Apex Body charged with the task of ensuring the

proper implementation of the Goitre Control Programme.

(2) The office of the Nutrition Adviser in the Health Ministry should be immediately upgraded, and the Nutrition Adviser also designated Commissioner for Goitre Control' and ex-officio Secretary of the National Goitre Control Board, who will in effect, be the Executive Officer of the Board.

(3) The Goitre cell in the Nutrition Adviser's (Commissioner for Goitre control) office should be adequately staffed, not only for purposes of periodic surveys of goitre prevalence, but also for overseeing the work of the analytical laboratories in different endemic States (see 9 below) concerned with quality control of the salt, and the arrangements for maintenance of the plants. The Goitre cell should have on its staff not only health/nutrition scientists but also well-qualified chemists who could help state agencies from time to time in the quality control operations, and engineers who could also help and advise State agencies in the maintenance of the plants and oversee the plant-maintenance operations. The Goitre cell could also help to service the Goitre Sub-committee of the Central Health Council (see 4 below) as also the National Goitre Control Board.

(4) The National Goitre Control Programme must find a place in the agenda of all Central Health Council meetings and a separate sub-committee of the Central Health Council with the Union Health Minister as chairman and Health Ministers of different endemic States as members, could discuss the status of the goitre problem and the progress of the control programme. If necessary, special meetings of the Sub-committee could also be convened.



(5) A report on the current status of the National Goitre Control Programme must also be included in the Health Minister's report to the Consultative Committee of Parliament attached to his Ministry. The Members of Parliament from the endemic States must be fully briefed on the importance of the goitre problem and the current status of the goitre-control programme in their respective States.

(6) Goitre Control Boards must also be set up in the different endemic States on the same pattern as the National Goitre Control Board, with the State Health Minister as Chairman and the Nutrition Officer or the Officer of Health entrusted with the responsibility of overseeing the Goitre Control Programme in the State as Secretary.

(7) Goitre cells may be set up in the Health Directorates of endemic States and staffed with: (i) health/nutrition scientists who could either independently or in collaboration with the Central Goitre Cell team undertake periodic surveys of goitre prevalence; (ii) chemists who could be involved in quality control operations; and (iii) junior engineers or mechanics who could be entrusted with the task of helping in the maintenance of plants.

(8) The Commissioner for Goitre Control could hold frequent conferences with the Nutrition/Goitre Officers of endemic States in order to review the progress of the Goitre Control Programme and institute any remedial measures where necessary.

(9) A Laboratory in each State should be identified and adequately staffed and equipped to carry out quality control operations to check iodine levels in salt from the market. This Laboratory could be officially designated as the appropriate testing laboratory under the PFA rules for legal purposes.

(10) The active involvement of the medical colleges of the States (of their Preventive Medicine departments) in monitoring the goitre prevalence, and (of their biochemistry departments) in frequent checks of iodine levels in random salt samples (obtained from markets and the homes through the good offices of the health personnel and anganwadi workers) may be encouraged. These checks may not serve punitive purposes but will provide valuable feed-back with regard to the actual use of iodised salt to the State Civil Supplies Department and may help them to plug loopholes. Incidentally, this will also serve to promote the interests of the medical community in the State in the implementation of the programme.

(11) The total budget to cover the entire cost of installation of new plants, maintenance of plants, quality control, monitoring and evaluation, goitre cells in the Centre and the States, cost of iodination, etc., could be shared on a 50%-50% basis by the Centre and the States; the share/contribution by each endemic State towards the 50% will have to be in proportion to the amount of iodised salt allocated to each State, each State's share being reflected in the State's Plan Budget.



## 1.5 Production of iodised salt

It must be obvious that for the effective prevention and control of endemic goitre, adequate quantities of iodised salt of good quality should be produced and distributed to the endemic States, so as to ensure the ready availability of such salt to the populations of the endemic States all round the year. Unless this basic condition is fulfilled, regulations prohibiting entry of uniodised salt into the endemic States will prove meaningless and cannot be implemented. As a result of our studies, we are now convinced that practically all the constituent elements and links in the production-distribution-consumption chain are currently weak and inefficient. We may first consider production.

**Number of plants:** The current installed capacity of the plants set up for the production of iodised salt in the country is highly inadequate to meet the barest minimum needs of the endemic States. Considering that the standard plant produces 5 tons per hour, providing for 3 shifts of 8 hours each working for 25 days in the month, one plant can produce 36,000 M.T. a year. On the basis of the computation that each individual requires about 5 Kg salt a year, a single plant of standard capacity can provide salt for nearly 7 million people. If, however, only two shifts (instead of three) are possible, then one plant can provide salt for about 5 million people. Since the population to be covered in the endemic regions is now roughly 170 million, and allowing for the population increases in the next two decades and the unavoidable bottlenecks in distribution, we need immediately 30 plants of standard capacity and possibly an additional 12 plants in the next two decades. As against this we have at present only 13 plants in all (not including the non-functioning plant in Assam).

The existing plants are working well below their installed capacity, producing roughly only 50% of their full capacity. Thus what is now actually produced will cover only 20% of our

overall requirement — this also, provided that the salt actually reaches the endemic areas. In deciding on the number of plants we must provide for inevitable power failures and our inability to run three shifts for 25 days in the month, and also for unavoidable bottlenecks in distribution.

The maintenance of the existing 13 plants originally donated by UNICEF has been apparently very poor. Thus it has been reported that in one plant in Howrah, a screw supposed to be 7" in diameter had worn down to 3½". The nozzles which spray the iodate are frequently found clogged and no uniform spraying and mixing can be ensured. Under the circumstances it is not surprising that the salt produced does not contain the requisite amount of iodine even at the level of production. In fact, quality control at the production level itself has been poor. It will be necessary to commission a well-qualified independent team of engineers to examine all the existing plants to find out how many of them can be salvaged and how many must be condemned as irreparable. The number of new plants to be commissioned will depend on this rapid survey.

In all probability we may, for the present, have to settle for a total of 30 plants to cover our immediate needs. This will imply that if we manage to salvage all the existing 13 plants, we will still have to provide for an additional 17 plants. It is not necessary to approach UNICEF for this purpose. The plants can be manufactured indigenously. In fact even the existing plants were manufactured locally (except for the nozzles) in the private sector. It is also understood that the fabrication of the plants can also be undertaken in the public sector by the Hindustan Salts Limited.

**Nation-wide Iodation of edible salt:** A suggestion has been made that in order to overcome current problems in ensuring supply of iodised



salt to endemic areas, we may resort to iodation of all edible salt produced in the entire country. We do *not* recommend this approach, which, apart from being far too unnecessarily expensive (we will need to install straightaway nearly 80 plants) will in no way help overcome the various factors currently responsible for the poor performance of the National Goitre Control Programme. Indeed this will add to our difficulties.

**Plant Capacity:** The question whether we should go in for bigger plants (10 tons per hour) has often been raised. The initial cost of the bigger plant may be 40% more than that of the smaller plant and we may save on maintenance. But the initial building cost will be higher and nearly double the number of men will be needed to handle the raw material input and output. Further, in case of machine failure, the effects will be obviously worse with a bigger plant. There will thus seem to be no special advantage in going in for the maxi-plants.

**The Submersion Process:** The Bhavanagar Salt Research Institute (C.S.I.R.) has developed a process for the preparation of iodised salt using the less expensive Calcium iodate, and the submersion technique. The process has been proved to be technologically feasible and the product physiologically effective. The great advantage will be that the vagaries in electric supply which affect production in the present plants will not come into the picture here. As against this some limitations of this process have been pointed out. Though the installation and maintenance of the plants will be less expensive, they will also need covered buildings in order to ensure uninterrupted production even during rainy season. During rainy seasons and under humid conditions, drying may pose problems. Calcium iodate used for iodination in the submersion process is much less expensive than Potassium iodate. Studies in the National Institute of Nutrition had also shown that losses of iodine on storage are far less with the Submersion process which uses Calcium iodate (1.0% as against 8.9% with Potassium iodate in the conventional plants).

We recommend that the submersion process may be tried out in two or three locations and should it prove satisfactory we may opt for this process to meet our future needs.

**Quality of salt used for iodination:** One of the major reasons for current non-use of iodised salt is the poor appearance and low acceptability of the salt, arising from the fact that poor quality salt of the PAN or Kyar varieties are being used by Hindustan Salts. It is desirable that, as per the Prevention of Food Adulteration Act (PFA) rules the Sodium Chloride content of the iodised salt is maintained at 96%. The better appearance will be more appealing to the consumer and will ensure better acceptability. The loss of iodine on storage may also be less with the use of better quality salt.

**Level of Iodination:** In the plants now in operation, iodination is carried out with Potassium Iodate which is added to the salt at a level of 25 ppm. In the submersion process Calcium Iodate (which is much cheaper than Potassium Iodate) is used. Iodine is now imported under Open General Licence from Chile and Japan. Each kg of iodine costs about Rs. 300/-. At present we import 3 tons of crude iodine. Crude iodine is being converted to potassium iodate for Hindustan Salts Limited by a private firm (Electromet). Three tons of crude iodine will yield about 4.65 tons of potassium iodate. This amount will be sufficient to iodate about 1.9 lakh tons of salt at the present level of 25 ppm. We will immediately require at least 5 times the amount of crude iodine we now use for salt iodation if we step up the iodated salt production to the levels discussed earlier and 10 times the current amount if we double the level of iodination.

We have to seriously consider the question as to whether the level of iodination should not be stepped up from the present level of 25 ppm to 50 ppm. A large operation in which we end up by delivering inadequate levels of iodine will be wasteful. Iodated salt even in stitched plastic bags stored under proper conditions at room temperature, loses significant proportion of iodine by about 4 to 6 months after storage, and in the case



of jute bags the loss will be much higher. In a vast operation it may not always be possible to ensure ideal conditions of (air tight) packaging and storage, and we have to be prepared for significant losses of iodine between the points of production and consumption. The studies of Dr. K. N. Agarwal and Dr. (Ms) D. K. Agarwal have shown that most samples of iodised salt tested by them had far less than 25 ppm. With the new arrangement proposed (see below), namely location of iodation plants near the consumption points, the time interval between production and consumption may be nearly halved. Even so there is merit in raising the level of iodation, and we recommend an increase in the iodination level from the present 25 ppm to 50 ppm. In other countries where better packaging and storage can be ensured, levels of iodation as high as 100 ppm have been resorted to without any serious ill-effects.

**Location plants:** The question of the location of future plants is important. The balance of advantage will seem to lie in locating future plants at major *terminal* railway points *nearest to* or *within* the endemic State. If this is done, we can institute a system by which all edible salt (other than that manufactured in the existing 13 plants) arriving at the terminal is off-loaded and moved to the plant for iodation and storage in godowns for further distribution within the State. The Salt nominees or the Cooperative entrusted with import and distribution of salt will be free to obtain uniodised salt from any commercial source; they will have no advantage in trying to beat the iodation regulation, since in any case the entire cost of iodation will be borne by the Government. We understand that the Railways which at present accord the 'B' category only for iodated salt, will be willing to extend this facility for all salt being moved to the endemic goitre belt for iodation at the plant located near the terminal railway point. The location of the plants within the States will also facilitate the active participation of the States in the maintenance of the plants, supervising and monitoring iodation, in quality control, and in overseeing packaging and distribution arrangements. Many of the current ills and corrupt practices, such as Salt nominees going in for commercial uniodised salt in pre-

ference to Hindustan Salts' iodised salt and passing off such salt as iodised, can be taken care of through this arrangement. Iodation can be better enforced and monitored.

If this principle is agreed to, the Union Health Ministry, the Salt Commissioner, the Railways and the 'endemic' State authorities could decide on the ideal and convenient locations for all the new plants.

**Private and Public Sector:** The question as to whether the setting up of some iodation plants can be entrusted to the Private Sector has been raised. It has been suggested that at least the plants employing the submersion process may be entrusted to the Private Sector. The cost of the iodation may have to be subsidised by the Government. The Private Agency will be forthcoming if it is given the monopoly for distribution of the salt iodated in its plant within a specified zone. The advantage may be that a private agency may be vigilant (perhaps more vigilant than the government) to ensure that other (uniodated) salt does not enter its zone and cut into its sales. There are quite a few reputed private salt manufacturers in the country who may be depended upon to produce and distribute salt of good quality and required specifications, and there may be a valid case for involving their participation in the goitre control programme. Dr. K. N. Agarwal and Dr. (Ms) D. K. Agarwal in their report have also suggested that Tata's salt may be iodised, possibly with a partial subsidy from the Government. Tatas officially deny that they market their product in the endemic States. However, since in spite of this policy of Tata's, it appears that considerable quantities of this salt (or what passes for it) are in any case entering the endemic zones to somehow meet the demands of the affluent groups, it may be more feasible to ensure that part of the production of Tata's salt or any other brand of refined salt which may be earmarked for the endemic States, is iodised than to specifically enforce the embargo on the entry of such salt into the endemic area. Such salt, because of its high price, may still account for only 5% to 10% of the total offtake of salt by the State (same as at present) and may, therefore not significantly affect the public distribution of the much less



expensive iodised salt from the public sector plants to the masses. It may perhaps be good strategy to enlist the willing cooperation of at least the reputed salt manufacturers in the goitre control programme.

The new plants may also be set up by the State Industrial Development Corporations, either as public sector or joint sector undertakings. In such a case, the State Government will also be involved, and for this reason this may be a better arrangement.

The question of involving Private Agencies in production of iodised salt is, however, a major question of policy for the Government to consider. One thing is, however, clear. The responsibility for production of the entire iodated salt needed in the country should not be entrusted to the Hindustan Salts Limited alone. The responsibilities now entrusted to them are heavy enough and if they can discharge these more satisfactorily than they have been able to do so far, they would have done well indeed.

**Salt import from Pakistan:** The Government may look into the present arrangement for import of rock salt from Pakistan. Though the amount being now imported appears small, according to the report of our investigators, this import has significantly cut into the offtake of iodised salt by Jammu & Kashmir, Punjab and Himachal Pradesh.

**Maintenance:** When we do set up plants, we must also create proper arrangements for their

maintenance. Local mechanics properly trained and retrained should be regularly and continuously engaged in the job of maintenance of each and every plant. From the central level, from time to time, two or three well-qualified engineers should be engaged to go round to inspect the plants periodically and ensure and certify that the plants are in good order. Replacement of parts and repairs must be quickly undertaken in order to avoid short-falls in production. A satisfactory arrangement could well be that the job of maintenance and periodic servicing may be entrusted to the manufacturers from whom the plants were originally ordered.

**Water pollution:** In their report to the Foundation, Dr. K. N. Agarwal and Dr. (Ms) D. K. Agarwal, while emphasising the major role of iodine deficiency, have argued that there is considerable circumstantial evidence from their studies that polluted water supply could aggravate goitre in the endemic areas. The hypothesis of the role of water pollution in the pathogenesis of goitre is an old one and not indisputable. Even so, we commend their suggestion that "goitre prone areas should be included as priority areas for provision of safe drinking water under the National Water Supply and Sanitation Programme of the Government". Quite apart from the problem of goitre, the importance of safe water supply from the point of view of health promotion is well-known. People in the goitre prone areas already at risk of endemic goitre could at least be spared the added risk of alimentary infections, even if one chooses to doubt the contribution of safe water supply to goitre control.



## 1.6 Parenteral iodine administration

In inaccessible areas where timely transport of iodated salt is difficult, the use of iodinated oil injections merits consideration. Some locations in the State of Jammu & Kashmir (Leh and Kargil in Ladakh and Doda Gilgit areas), in the North-eastern hilly States, and in the tribal areas in Madhya Pradesh and Gujarat, will fall in this category. Iodinated oil injections have been tried successfully in special situations in many countries. In highly endemic areas, oily injections can be used in ante-natal care in pregnant women suffering from goitre. These injections may be given to women in the reproductive period and to children and need to be repeated in the same subject only after a period of 5 years.

The disadvantages of this procedure are (1) its cost (oily preparations are now obtainable only from a French firm and are very expensive); (2) its administration involves the use of disposable syringes in order to avoid risk of contamination; (3) it will be dependent on doctors and health personnel and will therefore be limited by the present poor outreach of our health services.

Obviously this approach can at best be only an adjunct to iodised salt distribution, suitable for certain special locations such as the highly endemic areas with high prevalence of cretinism, and as part of ante-natal care through MCH centres and health clinics where it can be administered along with tetanus toxoid.

It is understood that the Chinese have recently developed a technology for preparation of iodinated oil using soya bean oil. If this technology becomes available, the procedure may become much less costly than at present. Our National Chemical Laboratory at Poona may be charged with the task of developing a suitable technology.

For the present, limited stocks of iodinated oil for parenteral use may be made available for use in the relatively inaccessible areas of Kashmir, North-Eastern States and the Adivasi areas of Bharuch, and to certain MCH and health clinics in selected endemic areas. This approach could also be tried initially in some of the I.C.D.S. blocks falling within the goitre-endemic zones.



## 1.7 Packaging Transport and Distribution

**Packaging:** Uniodised salt being transported to iodation plants may continue to be packed in gunny bags during transport as at present. However, we recommend that after iodination, the salt should be packaged in 75 kg hessian bags *provided with polythene lining*. The outer hessian bag can be provided with loops on either side at the top in order to enable lifting the bags by steel hooks without tearing them. The increase in cost as the result of polythene lining will be marginal and may work out to less than 0.2 paise per kg — an insignificant increase indeed considering the considerable benefit of increased iodine retention and better quality which polythene lining will confer. We recommend this step since studies carried out by Dr. D. N. Agarwal and Dr. (Ms) Agarwal on salt samples at consumption sites in different endemic States show considerable loss of iodine possibly because of poor packaging and resultant greater exposure to humidity and other unfavourable weather conditions when iodised salt is stored under humid conditions in gunny bags. The salt when it finally reaches the consumer will be more acceptable if it is properly packed as suggested above. We also feel that there will be less loss of salt due to handling if an additional polythene lining is provided as also the hooks at the top of the hessian bags to facilitate lifting.

It may also be useful to arrange that 5% to 10% of the iodated salt is also packed elegantly in polythene bags as small packs of 1, 2 or 5 kg. These may be priced somewhat higher. This will serve to wean away the middle classes and the rich from uniodised Tata's salt and other brands which are offered for sale in elegantly packed polythene bags. Each pack must carry the date of iodisation.

**Transport:** The fact that there is no 'salt famine' in any of the endemic States would show that the complaint that railways often delay the transport of salt has no validity. Uniodised salt does not

enjoy the same priority as iodised salt in the matter of rail transport. Even so large quantities of uniodised salt are now reaching the endemic States, and there is certainly no 'salt famine' in any endemic State. Indeed in Mizoram where no iodised salt reached, uniodised salt is freely available. This would show that railway transport is not a major bottleneck.

With the new arrangement proposed, whereby iodisation plants will be located in or near the endemic areas, uniodised salt will be transported by railways to such plant sites at the terminal railway point; the Railways have to be prevailed upon to provide the same top category for uniodised salt being moved to iodation plants as they are now according to the iodised salt. Our discussions with the Railways indicate that they will readily cooperate in this regard.

During rainy seasons and under uncertain weather conditions, the Railways must cooperate by providing covered wagons for salt transport.

**Distribution:** The State Civil Supplies Department should be entrusted with the task of ensuring distribution. They may use any mechanism — Salt nominees or Cooperatives or any other means which they find most appropriate to the State. The present arrangement by which Salt nominees appointed by the State are expected to lift iodated salt from HSL after advance payment has not worked satisfactorily. The salt nominees apparently find it more profitable to obtain less expensive uniodised salt from private manufacturers and pass them off to dealers as iodised salt. Uniodised salt from private commercial sources are apparently less expensive than the salt from HSL. This accounts for the fact that a considerable proportion of iodised salt produced at HSL is now not being lifted.

The management of the plants as well as the



distribution could be undertaken by Cooperatives of Consumers & Producers — the current salt nominees, the intermediaries and consumers can all be brought into the Cooperatives. The Maharashtra State has attempted this approach and other States may wish to follow this example.

In addition to the conventional channels, iodised salt could also be sold through fair price shops and ration shops like other food commodities.

The responsibility for distribution must squarely

be placed on the State Civil Supplies department. If there is a sustained programme of monitoring the quality at the home and market level by health functionaries, malpractices can be checked. In addition, if the local Public Health Laboratory which should be statutorily recognised for quality testing for legal purposes, is properly equipped and staffed by officers of integrity, proper distribution of iodised salt can be ensured. Indications that the programme is failing to show impact should immediately alert the authorities and call for a scrutiny of the whole chain of operations in order that defects are detected and remedied in time.



## 1.8 Monitoring, Evaluation and Research

In the light of the experience over the last two decades, it is obvious that sustained vigilance will be essential in order to identify weaknesses and defaults in the chain of operations involved in the control programme; such identification will be worthwhile only if a competent machinery exists to immediately correct the distortions detected. The arrangements suggested earlier in this report should help ensure that reports of evaluation and monitoring will be quickly acted upon.

Monitoring and evaluation operations have the following objectives:

1) That the iodination plants are maintained in good working condition: arrangements for maintenance of plants were discussed earlier. The engineers at the Central Goitre cell must make frequent visits to the different plant sites in order to certify to the National and State Goitre Control Boards that the plants are in good working order. Replacements of parts must be anticipated well in advance so as not to hamper production.

2) That the salt produced at the plant site does contain the stipulated level of iodine: Quality control of the salt at the production level must be carried out not only by the manufacturing authority but also by the State Goitre cell. This must also be checked periodically by the Central Goitre cell.

3) That the iodised salt is packed according to specifications and stored in hygienic environment, not exposed to rain and vagaries of weather: It must be ensured that the specifications with regard to packaging are strictly adhered to. This can also be done by the same maintenance engineers and the Quality Control chemists who visit the plant and storage sites.

4) That there are no bottlenecks in transport of salt to the iodisation plant and therefrom to the actual consumption sites: Railway authorities

must ensure that all the salt destined for the endemic areas for iodination gets a high category for transport entitlement and that covered railway wagons are made available for this purpose especially in rainy season and under uncertain weather conditions.

5) That the iodised salt actually sold in the market does contain requisite levels of iodine: The iodine level in the market and home samples may be monitored for purely feed-back purposes (and not for punitive action) by the State health agencies and the laboratories at the State goitre cells and the local Medical Colleges. The Central Goitre Cell may also help in this operation from time to time. The chemists of the State Public Health Laboratory specifically designated under PFA rules may carry out such checks for legal purposes.

6) That the salt actually consumed in the households does contain iodine at the required levels.

7) That no uniodised salt or salt with spurious claims of iodination enters the market: Information regarding use of uniodised spurious salt should be immediately passed to the concerned authority for punitive action and seizure of stocks.

8) That the actual prevalence of goitre as assessed by periodic surveys shows a gradual and significant decline: Surveys of prevalence of goitre must be carried out at six-monthly intervals by the State teams and the medical college teams and at yearly intervals jointly by the Central and State teams.

Detailed data obtained in the course of the monitoring and evaluation operation must be presented to the State Goitre Control Board which may meet at least thrice in a year. Collated



reports from different endemic States must be presented through the Central Goitre cell to the National Goitre Control Board which may meet twice in the year and also the Goitre Sub-Committee of the Central Health Council. A detailed report on the progress of the goitre control programme may be prepared by the Central Goitre Cell for presentation by the Union Health Minister to the Consultative Committee of Parliament attached to the Health Ministry and for release to the Press. Detailed reports regarding each endemic State must also be made available to the concerned members of Parliament and of the State Legislatures.

**Research:** There is considerable need and scope for further research into various aspects of goitre control. Such research can be carried out at the National Institute of Nutrition, All India Institute of Medical Sciences, Post Graduate Institute, Chandigarh, Central Marine Research Institute, Bhavanagar, Regional Research Laboratories at Srinagar and Jorhat and in the Medical Colleges of the endemic States. The aspects of the problem that require special attention, among others, are the following:-

1) Studies of the kind carried out by Dr. N. Kochupullai & others at the All India Institute of Medical Sciences on cord bloods in endemic goitre areas for assessment of thyroid hormone (T4) deficiency in the newborn must be further extended. In these studies the authors do not state if the mothers actually had goitre or not, nor was there any attempt to correlate the degree of maternal goitre with cord blood levels of thyroid hormones. The 3% levels of hormone deficiency in cord blood reported by them is surprisingly high and this observation has to be verified by other groups. If this is confirmed, the implications of this disturbing observation deserve careful study.

2) Studies of the type reported by Dr. K. N. Agarwal and Dr. (Ms) D. K. Agarwal (carried out on behalf of the Nutrition Foundation of India and currently under publication) on the developmental lag in children of goitrous mothers are

extremely important. Such studies could show that the problem of mental deficiency in children in goitre-endemic areas is far more widespread than the problem of cretinism.

3) The technology for preparation of iodinated oil for parenteral use should be developed indigenously. With the present arrangement whereby iodine for parenteral use has to be imported at considerable expense, it can only find limited use. If inexpensive indigenously made preparations become available, they can be widely employed as an adjunct to iodised salt in health centres and antenatal clinics, especially in the remote hill areas which are not easily accessible. It will be extremely important to develop this additional avenue of approach to the Goitre control programme, which will help to offset the deficiencies in iodised salt supply and consumption in endemic areas.

4) More satisfactory and less expensive methods of iodation of common salt should be explored. Thus calcium iodate used in the submersion process has been found to be less expensive and superior to Potassium iodate from the point of view of loss of iodine on storage, though the submersion process has also its own disadvantages. Other methods of iodation deserve to be explored, especially for the high-humidity and high-rain zones of the North-East where the submersion process may run into difficulties.

5) Further research on desirable levels of iodination appropriate for different areas require to be undertaken.

6) Studies of iodine availability where food is cooked in polluted water or hard water are also necessary. These studies may throw important light on desirable levels of iodination and incidentally on the effect of water pollution (see 8 below).

7) Better and less expensive methods of packaging iodated salt in order to reduce iodine losses during transport and storage, and to preserve the



good appearance and acceptability of the salt must be identified and their feasibility tested out.

8) Dr. K. N. Agarwal and Dr. (Ms) D. K. Agarwal have again raised the old question of the possible role of polluted water supply in the aggravation of

goitre. Their studies show some circumstantial evidence in support of this view. This old hypothesis seems to require further investigation, especially as more areas endemic to goitre outside the sub-Himalayan regions are being identified, and as Goitre would appear to be a more extensive problem than hitherto believed.



# **2. CURRENT STATUS OF THE NATIONAL GOITRE CONTROL PROGRAMME**

**Report submitted to the Nutrition Foundation of India**

**By**

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**and**

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## 2.1 Preface

On behalf of the Nutrition Foundation of India, Dr. K. N. Agarwal and Dr. (Ms) D. K. Agarwal visited most of the goitre-endemic States and carried out a detailed on-the-spot assessment of the current status of the National Goitre Control Programme. They furnished to the Foundation an exhaustive detailed Report which contained not merely their actual observations but several suggestions and recommendations. These were discussed with them in great detail and many of their recommendations have been incorporated in the blueprint presented earlier, some of their suggestions have been modified in

the light of discussions with other Agencies.

An abridged and edited version of their detailed Report to the Foundation is presented in the next few pages. These authors will also be independently publishing their observations on special aspects of the problem studied by them in other journals.

The Foundation expresses its appreciation of the meticulous care and dedication with which the authors had carried out the study.

*C. Gopalan*



## 2.2 Introduction

This study was carried out as part of a project which the Nutrition Foundation of India had undertaken, at the request of the Government of India, to prepare a blueprint for the intensification of the National Goitre Control Programme. The Foundation entrusted to the authors the task of visiting the different endemic States and report on the actual status of the National Goitre Control Programme.

The objectives of the study undertaken by the authors were to: (1) investigate the current status of the National Goitre Control Programme in the endemic States; (2) identify the current bottlenecks and deficiencies in its implementation; (3) provide first-hand data to the Nutrition Foundation of India, in order to enable it to prepare its recommendations to the Government for the intensification of the Programme.

In pursuance of the above terms of reference, we visited almost all the endemic States (Table I) and adopted the following methodology.

- 1) Meeting the officials of State Health Directorates to gather data present or past, available on the goitre problem of the State.
- 2) Meeting Secretaries of Health, Social Welfare, Civil Supplies, Industries, etc., to find out the existing state of supply of iodised salt, problems encountered and suggestions for improvement.
- 3) On-the-spot survey of school children in rural

and urban populations to actually assess the prevalence of goitre in the area.

- 4) Interview medical and para-medical personnel so as to assess their knowledge of, and involvement in, the goitre control programme.
- 5) Interview communities so as to assess their views on the goitre problem and their attitude towards the control of goitre.
- 6) Interview traders and personnel of cooperatives to identify bottlenecks in the supply and sale of iodised salt.
- 7) Testing developmental lag in pre-school children of goitrous mothers.

Our observations gathered in the course of these visits and discussions are briefly set out in the next few pages.

**Acknowledgement:** Our deep gratitude is due to the Nutrition Foundation of India, and particularly to Dr. C. Gopalan, for extending us this opportunity to study and report on a major national health problem. We are thankful to him for all his affectionate support, and several critical suggestions in the conduct of our work.

We also express our thanks to the numerous officers in the Centre and in the States that we visited for all their cooperation.

Our thanks are due to the poor people belonging to the communities we surveyed for all their affection, hospitality and cooperation.



**Table 1: Visit Programme**

States	Places	Work undertaken
Uttar Pradesh	Pilibhit	— School surveys
	Lucknow	— Mental development studies — Discussions with the Secretary Health, DGHS and others.
Himachal Pradesh	Simla	— Surveys — Discussions with the Secretaries and Directors of Health & Social Welfare, Civil Supplies, Transport, Industrial and other officials. — Meeting with traders and community
Jammu & Kashmir	Srinagar	— Meeting with Secretaries and Directors of Health, Social Welfare, Industries, Civil Supplies.
	Pahalgam Chandanwari Phulwama Jammu	— Visiting Gujjar & Bakarwal communities. — Surveys
Gujarat	Bharuch	— Surveys
	Baroda	— Collection of water samples
	Bhavnagar	— Meeting at the Central Salt and Marine Chemical Research Institute.
	Ahmedabad	— Meeting at the Health Directorate
Rajasthan	Jaipur	— Meetings with the Salt Commissioner of India and Managing Director, Hindustan Salts Ltd.

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**Table 1: Visit Programme (Cont'd)**

<b>States</b>	<b>Places</b>	<b>Work Undertaken</b>
Delhi	Ministry of Health All India Institute of Medical Sciences	— Discussion in Goitre Cell — Department of Medicine
West Bengal	Calcutta	— Visit to Salt Gollahs — Health Directorate — Civil Supplies Directorate
Assam	Gauhati Kamrup	— Discussions with Directors Social Welfare and Health — Survey work in PHC Chaygaon
Nagaland	Dimapur Kohima	— Discussion at the Directorate of Health and Social Welfare and survey in village Kohima
Manipur Imphal	Moraing Imphal Yaripok	— Survey work — Meeting with the Chief Engineer, Public Health, Engineering Department. — Secretaries of Social Welfare, H.C.I., Directors Industry and Health
Bihar	Patna Champaran	— Discussion with Director Health Services. — Survey at Champaran — Mental development studies



## 2.3 Report on visits to Endemic States

### 2.3.1 Uttar Pradesh

In Uttar Pradesh, presently 16 of the 20 districts are recognised as goitre-endemic. But in only 9 of these districts have goitre control operations been attempted; the seven other districts identified as goitre-endemic through base-line surveys several years ago are still left totally unprotected (see table 2). Even with regard to the districts in which goitre-control is supposed to be operative, the situation is, to say the least, far from satisfactory.

The State Health Directorate had *no* data regarding prevalence of goitre, and they were in no position to say if in the 9 districts where the control programme was supposed to be operative, there was any decline in goitre prevalence.

It is not as if the State authorities were not prodded by the Union Health Ministry and other Agencies. The Union Health Ministry had addressed a communication to the Secretary, Civil Supplies Department, U.P., suggesting the establishment of additional iodination plants in the State out of the 10 plants offered by UNICEF during 1981-83. The UNICEF representatives also continuously reminded the State authorities of this. A specific proposal for setting up 5 iodination plants — 3 in Eastern U.P. and 2 in hill areas — was made to the U.P. Government, after joint discussions between the Union Health Ministry and the State Nutrition Officer. But there was no response from the State.

The Salt Commissioner and the Managing Director, Hindustan Salts had pointed out to the Secretary, Food & Civil Supplies, U.P., that one district (Uttar Kashi) had taken only 29% of the district's requirement of iodised salt and two 'salt nominees' of the district who were allocated a quota of 22 wagons and 5 wagons per year respectively had not lifted any iodised salt at all. Obviously what they were supplying from their quota was uniodised salt obtained from other sources. Apparently no action followed.

The State Director of Health during his discussions with us, frankly admitted that the State Health Directorate was not doing anything to

control goitre in endemic areas. The State Health Department was not involved in monitoring the prevalence of goitre in the areas where iodised salt was supposed to be supplied. The State Health Directorate had neither prepared on its own nor received from the Centre any educational material on goitre for medical and paramedical personnel or for the public which could help in the promotion of the goitre control programme. The medical officer working in the goitre endemic regions had not received any special instruction or educational material with regard to detection, prevention and treatment of goitre.

At the State Directorate of Health, no special officer was responsible as such for looking after the goitre control operations. Whatever surveys were done, were carried out by the Central team visiting the State from time to time. There was no follow-up of the survey; long after the survey data had revealed high prevalence of endemic goitre, no action was initiated.

The story is really a sad one. The State with a poor health structure, unconcerned administrative machinery, heavy population load, and poor environmental health conditions seems most ill-equipped at present to meet the challenge of goitre-control.

#### Survey in Pilibhit district

We present the experience of our study in this district since it may throw light on the general problem. The Superintendent of the District Hospital was of the view that goitre during adolescence was a physiological process which needed no treatment! The Chief Medical Officer had attended just one meeting in the State Headquarters (Lucknow) when the National goitre control programme was discussed. Thereafter, the State health directorate had taken no interest in the subject! The district of Pilibhit has 7 PHCs (Primary Health Centres) with a total population of 10 lakhs. In order to assess the prevalence of goitre we chose 3 Blocks and carried out a survey of the prevalence of goitre. Pilibhit is a district 33



that is not yet covered by the goitre-control programme. In table 3 we have indicated the

actual prevalence of goitre in school children, based on the surveys directly carried out by us.

**Table 2: Assessment of goitre control programme in Uttar Pradesh\***

UTTAR PRADESH	Baseline survey year	Commencement of salt supply
District	(Prevalence rate) %	
1. Dehradun	1965 (39.7)	1966
2. Bijnore	1960 (23.2)	1960
3. Almora	1930 (40.0)	1966
4. Pithoragarh	1930 (40.0)	1966
5. Chamoli	1930 (40.0)	1966
6. Garhwal	1930 (40.0)	1966
7. Tehri Garhwal	1958 (3.5)	1966
8. Uttar Kashi	1930 (40.0)	1966
9. Nainital	1964 (30.0)	1966
10. Basti	1930 (30.7)	
11. Deoria	1973 (65.0)	
12. Bareilly	1974 (64.0)	
13. Gorakhpur	1930 (3.7)	
14. Rampur	1974 (35.8)	
15. Baduan	1956 (5.5)	
16. Bahraich	1930 (3.7)	
17. Kheri	1962 (20.0)	
18. Shahjahanpur	1974 (44.7)	
19. Pilibhit	1975 (41.3)	
20. Gonda	1978 (65.9)	

\*Source — Health Ministry



**Table 3: Goitre Survey in District Pilibhit (U.P.)**  
(Survey undertaken by the present team in March and July 1982)

Place	Goitre grade (%)					Prevalence %
	1a	1b	2	3	4	
NEORIA						
Boys						
6-12 years (193)	48	32	9	2	—	47.2
13-17 years (82)	22	11	3	—	—	43.9
Girls						
6-12 years (82)	14	6	3	—	1	29.3
PURANPUR AND SHERPUR						
School children						
6-12 years						
Boys (168)	76	35	11	1	—	73.2
Girls (222)	31	5	1	1	—	17.0
13-17 years						
Boys (58)	15	9	2	—	—	44.8
Girls (60)	12	3	3	—	—	30.0
AMERIA AND BADEPURA						
School children						
6-12 years						
Boys (172)	37	28	11	1	—	44.8
Girls (136)	15	23	8	—	—	33.8
13-17 years						
Boys (86)	23	18	13	2	—	65.1
Girls (19)	5	4	5	—	—	73.7
Number of subjects are given in ( )						



### 2.3.2 Himachal Pradesh

Himachal Pradesh is a State in which the goitre control programme has been operative for nearly two decades. Some areas in the State of Himachal Pradesh started receiving iodised salt as early as 1957 (Kangra valley) after initial surveys in 1956. The remaining districts were covered with iodised salt supply from the year 1963-64.

It is the impression of the medical officers, administrators and faculty members of the medical institutions that goitre is not seen in Himachal Pradesh any more. This is not true. The impression is probably based on the relative infrequency of goitre of grades 2 and above. Since State medical teams have never been involved in thyroid goitre control and survey programmes,

they do not perceive grades 1a and 1b and 2 goitres easily. This was confirmed by us in the course of our observations and discussions (Tables 4 & 5).

In Himachal Pradesh iodised salt supply for nearly two decades has undoubtedly made important initial contributions; severe forms of goitre are not seen. However goitre of grades 1a and 1b are still seen in school children. This would indicate either that the level of iodine in salt is not sufficient to control goitre or that iodised salt was being adulterated or that iodised salt did not cover the entire population. The salt samples collected showed that at the consumer level iodine values were 12-19 ppm only. (Table 5)

**Table 4: Review of the iodised salt supply in Himachal Pradesh and goitre situation.**

Areas	Year	Baseline survey prevalence rate (%)	Commencement of salt supply	Resurvey year and prevalence (%)
Kangra	1956	41.2	1957	1962—32.1
Una		41.2		1968— 9.9
Hamirpur		41.2		
Kulu		41.2		
Sirmor	1959	35.8	1963	1980 — 28.1
				1981 — 36.3
Mandi		20.9		1982 — 25.9
Bilaspur		25.7		MANDI — 1982
Mahasu		39.9		Proper — 35.0
				Sunder
				nagar — 37.5
				Bhangratu — 14.9

*Source : State Health Directorate, Himachal Pradesh*



**Table 5: Assessment of goitre problem in Himachal Pradesh**

Total population		School children = 1167 Population = 560			
Goitre grade percentage		Prevalence Total (%)	Salt samples content of iodine (ppm)		
1a	1b			2	
SIMLA				Market 14.0	
School children					
6-17 years					
Boys (486)		32.7	22.0	2.1	60.8
Girls (111)		39.7	7.5	1.8	49.0
BILASPUR					
School children					
6-17 years (17 yr = 5)					
Girls (328)		17.7	7.9	0.3	25.9
BHANGARATU				Market	
MANDI				Two different	
School children				shops — nil	
6-12 years					
Boys (155)		13.6	1.3	0	14.9
MANDI-GODDESS		22.0	11.0	2.0	35.0
FESTIVAL					Market
General					a) Civil supplies
Population (560)					shop — 13.3
					b) Traders (3
					months old)
					— 19.5
					c) *Polythene
					packet
					Chandigarh
					iodised.— nil
Overall prevalence 31.0%					
* There are no facilities for salt iodisation in Chandigarh, and yet salt in polythene packets claiming to be iodised are openly traded.					

A review of iodised salt supply from the year 1976 to 1981 in the State of Himachal Pradesh. Punjab and Jammu & Kashmir clearly demonstrates that the average consumption of salt in years 1976 and 1977 was 42,245 M.T. per year (Table 6). Of the total amount of iodised salt

allocated to the respective States, Punjab lifted only 23%, Himachal Pradesh 41% and Jammu & Kashmir 62%. The agreement concluded between the governments of India and Pakistan in 1978 for import of rock salt to India caused a significant decline in the lifting of iodised salt by these States 37



after 1978. Rock salt from Pakistan accounts for 7 to 8 thousand metric tonnes (average 7,648 M.T. per year), providing 17.7% of the total salt uptake of these States from 1978 onwards. Further, in these States, Tata's refined salt is also consumed in over 5% families. Interestingly enough, a senior officer of the Health Department of the State himself admitted that his family was using Tata's refined salt and not iodised salt!

The responsibility for this situation must rest mainly with the Ministry of Health, Government of India, and the Salt Commissioner. They should have warned the Ministry of Commerce of the impact of rock salt import on iodised salt consumption in these States during the last four years.

In 1980, the Central team found goitre prevalence as high as 28 to 30 per cent in Sirmur and Kangra districts. It appeared from our discussions that the State Health Directorate was not doing much for the goitre control programme and was mainly dependent on the Central team surveying goitrous areas. There was no proper education or training programme for medical and paramedical staff regarding monitoring goitre prevalence.

The salt samples collected by the Health

Directorate in 1980-81 showed that over 80% of the samples had no iodine or very little iodine. The high prevalence of goitre in Kangra and Nahan is apparently mainly due to poor distribution of iodised salt. Recently, the State Government has finalised with the UNICEF arrangements to establish an Iodination Plant at Nalagarh in district Solan.

**Mandi:** In Mandi and neighbouring areas, a survey had been conducted by the Ministry of Health and the goitre prevalence rate was found to be 40 per cent. At Tatapani a higher prevalence was recorded. Near Mandi (Darang) there are salt mines which provide salt mainly for cattle consumption. However, about 5 per cent of the population representing affluent sections are able to get this salt refined for their kitchen use.

The impression we gathered was that several affluent families in this town prefer Tata's (or what is being passed on as Tata's refined salt), this being mainly true of the wives of government officials and the educated community.

We visited one of the federation shops near the office of the District Supply Officer. We were told that Tata's salt (or what was being sold as "Tata's salt") was preferred and used and very few purchase iodised salt available there.

**Table 6: Supply of iodised salt for the years 1976 to 1981 in Jammu & Kashmir, Punjab and Himachal Pradesh**

(Figures in Metric tonnes)								
Name of the State	Annual quota	Name of the Unit	1976	1977	1978	1979	1980	1981
Jammu & Kashmir	34,000	Kharagoda	20,868.0	27,405.3	20,563.7	21,752.0	16,082.0	22,008.0
Punjab	20,000	Sambhar	6,999.7	6,902.2	6,070.1	5,103.5	3,307.2	4,236.9
Himachal Pradesh	24,000	— do —	7,696.5	11,202.2	6,951.1	9,545.0	10,616.7	9,103.7
Chandigarh (U.T.)	2,100	— do —	1,434.6	1,983.1	1,520.4	1,893.2	1,382.6	1,885.6
Import of rock salt			nil	nil	8,312.3	6,585.0	9,117.0	6,578.0
			36,998.8	47,491.8	43,417.4	44,878.7	40,504.5	43,812.2

*(The data were obtained from the Salt Commissioner of India)*



### 2.3.3 Jammu & Kashmir

Central team surveys were conducted in Jammu & Kashmir during 1963 to 1971, and the details are given below:-

**Table 7: Central team surveys in J & K**

Year	District	Prevalence %
1963	Udampur	33.0
1965	Anantnag	35.7
1971	Baramulla	38.2
1971	Doda	25.0
1971	Katchua	30.3
1971	Punch-Rajori	26.8
1971	Srinagar	26.6
1971	Jammu	27.6

After these initial surveys, the entire State of Jammu & Kashmir was declared endemic for goitre and the supply of iodised salt was started around 1974 (data available from the State Health Directorate).

The revised survey to assess the impact of iodised salt was due in 1980-81. However, no activity was observed regarding this repeat survey. Therefore it is not possible to assess the impact of iodised salt in controlling the situation of goitre.

There are separate directorates of health for Kashmir province and Jammu province. We met the Directors of Health at Srinagar and Jammu separately. The meetings with various members of the Directorate of Health Services and finally with the Secretaries of Social Welfare, Health and Family Welfare, Industries and Civil Supplies led us to conclude as follows:

1) The type of salts available in the State of Jammu & Kashmir are:

- Iodised salt commonly known as *Hindustani Namak*.
- Rock salt known as *Pakistani Namak*.
- Tata's salt known as *Refined Salt*.

The assessment was that 10% of the population was using rock salt exclusively and another 10-20% partly, while 5% were using Tata's salt. Interviews with various families showed that as many as 10% of the mothers were washing the *Hindustani Namak* (iodised salt) before using it for cooking. Preference for rock salt was very high for its assumed

qualities of (i) bringing blood pressure under control, (ii) controlling fertility. It appeared that many families were habituated to the use of rock salt. Fortunately, it was 3-4 times costlier than the iodised salt and therefore iodised salt was used by the masses. Tata's refined salt was also very commonly in use in educated families who consider this to be a better variety than other salts. Though the State of Jammu & Kashmir has an impressive health structure with two separate Directors controlling Jammu & Kashmir provinces and also separate Additional, Deputy and Assistant Directors for various programmes, there was no one to coordinate the activities of the Goitre Control Programme.

The total requirement of the State for iodised salt is 31,167 M.T. Unfortunately, the State nominee lifted only 19,968 M.T. (62%) during the last year. One firm which had cancelled its order for iodised salt purchased instead 5,000 bags of ordinary salt from Delhi. The impression from various State, district and block level medical officers was that the disease still exists in Gujjars and Bakarvals. Many of them moved to Jammu region during winter and to Ladakh in summer with their cattle. The team followed the movement of these nomads from Srinagar to Chandanwari and found that a considerable proportion of women of 20-30 years of age had goitre.

**Survey work:** In Village Frisland (in Pahalgam area) out of a population of 600 surveyed, 15.5% had goitre with or without adenoma. Some cases of goitre were also observed in a village in district Pulwama. The only chemist and druggist within the village said that his impression was that 10 years ago everyone above 30 years of age had visible goitre. Six years ago he was selling lots of iodine preparations, but at present he has none in stock. From an on-the-spot survey of the village population, it appeared that as many as 12-15% of young children had goitre of grades 1b to 2. The two salt samples checked from these areas had iodine levels as low as 1.6 ppm. The Director, Health at Jammu (who was the Director of the whole State of J&K six months earlier) was of the opinion that the disease was still a public health problem in J&K. According to him, the supply of iodised salt was erratic and there were many types of salts in the market. The implementation of Food Adulteration Act for iodised salt was not at



all stringent, hence failure in the control of the disease. He was also convinced that certain relatively inaccessible areas in J&K should be covered by parenteral iodine administration which could be an adjunct to iodised salt supply in the State. Smuggling of uniodised salt in the State was difficult to check due to close proximity of the State to Punjab and Pakistan. The Dal Lake house-boat runners were also suffering from goitre.

The salt samples collected by the State Salt Department show that during 1981-82, 12% salt samples contained little or no iodine. A similar situation was observed in 1982.

There was no interest in the State regarding the setting up of iodination plants. An important finding was that the salt obtained from *private salt manufacturers was only half as costly* as the iodised salt supplied by M/s. Hindustan Salts Limited. Therefore the chances of adulteration are indeed very high and the members of the Health Directorate at Jammu were of the view that this was possibly happening in Jammu itself.

For the control of goitre in nomads (existing population 4-5 lakhs) and also of the population living in Leh and Kargil (Ladakh) and Doda Gilgit areas and other difficult areas, iodine injections may be the answer. Our assessment was that these communities prefer injections than other oral medicines as treatment. These areas are cut off from the main parts of Jammu & Kashmir for 6 months due to snow. Hence transport of iodised salt or for that matter of any food to this area would be possible for 6 months in the year only. Therefore it appears to us that there must be considerable loss of iodine in transit. Providing iodine injections to this population would be a good strategy for control of goitre.

The general impression that we gathered was that goitre after an initial decline was again reappearing in some of the villages.

We visited the Regional Health and Family Welfare Training Centre at Srinagar. We were glad to find that there was mention of goitre, its etiology and control measure in the book provided to Rebre Sehat (3 months training course). However, the training course for multipurpose workers was only of one month duration and no education regarding goitre was imparted. In the office of the Principal of this Regional Training

Centre which had display-boards for health educational materials, to our surprise, the only material displayed was on diabetes and how to control it! The accompanying Deputy Director of Health and various other team members were unable to give us any figures for prevalence of diabetes in Jammu & Kashmir. This was a striking indication of wrong priorities since many of the multipurpose workers who were visiting this Centre might carry with them the impression that diabetes was an important subject to be covered by them unlike goitre which was not mentioned in their training programme. This impression was further confirmed as the teachers of the Regional Training Centre themselves were found to have poor knowledge of goitre or indeed of even other common health problems like tuberculosis, worm infestations, etc., which are still major health diseases in the State.

### 2.3.4 Gujarat

**Bharuch:** The problem of goitre in the district of Bharuch has been known since 1914 when McCarrison pointed out that the people living in the valley of the river Narmada in the State of Gujarat were suffering from endemic goitre. Edibam et al 1972, and Trivedi et al 1979, reported prevalence rate of 36.7% and 22.9% respectively. The Central Goitre Survey team in 1977 also found prevalence rate of 33.6% and 31.4% in urban and rural areas, respectively. The Higher prevalence rates of 65%, 55% and 42% were observed in Dadiopada, Sagbara and Nandot talukas, respectively.

The Central survey team had surveyed the area in 1977 and found that various areas of district Bharuch were endemic. After establishing the endemicity in 1977, the Central team unfortunately did not inform the State health department regarding the prevalence of goitre in this district and the report was received by the State only in August 1981! (at least this is what the State authorities claim).

The necessary legislation for providing iodated salt was issued in 1982. The legislation has been challenged in courts. In any case, it appears to us that legislation banning entry of uniodised salt is likely to be ineffective under the circumstances. Presently most of the families have stored un-



iodised salt for the period of about one year. We feel that this situation is attributable to the fact that the public have not been informed or educated as to why iodised salt is necessary for them. If public cooperation is ensured, there should be no difficulty in the supply of iodised salt in the State of Gujarat; Kharagoda situated 200 km from Bharuch should be able to meet the supply for the iodised salt to this district.

We were interested to evaluate (1) current status of goitre in school children, (2) relationship of water supply with goitre problem, and (3) efforts made by the State and Central governments to control the disease.

i) Junaraj, an adivasi village in Nandod taluk is 16½ km from Rajpipla and 4½ km from Karzan dam. This village is isolated in hills and a small rivulet (Narmada-Karzan) forms the source of water supply. The population is 1311. Recently one ICDS Anganwadi has started functioning. There is a primary school with 138 children on rolls. The result of goitre survey in the area is shown in Table 8. The Village Mukhiya (headman) has three wives, and all of them had goitre grade-2 (see photograph). The soil sample here contained no iodine.



**Figure 2**

*The wives of the village headman of Bharuch showing goitre.*

ii) Jharia, another adivasi village near Rajpipla is also situated on the banks of river Sakuli; population 1100. In this village, besides river water, 40% of households were using well water (4 wells). Wells are chlorinated fortnightly by the CHV (Community Health Volunteers). The village is about 17 km from Rajpipla, but only 6 km

away from Baroda. Therefore food provisions and salt are arriving from Baroda. It is costlier for the traders to buy goods including salt from Rajpipla than from Baroda. Neither the traders nor the Consumers Cooperative Society were selling iodised salt. Table 8 presents the survey data for this village also.

iii) Vagra: This is also situated on the banks of a river, 25 km from Bharuch. There is a PHC situated in the centre of the town. There are 3 schools, i) Primary for boys and girls separately, and ii) High School with co-education. Until 1975, people used river plus well water for drinking purposes. During 1975 and 1977 municipal tap water supply was introduced. Adivasis still prefer to drink well water which is chlorinated every fortnight. Two adivasi colonies were examined (total 100 persons — 14 families — no goitre was observed). The observations from schools reveal early stages of goitre (Table 8). The soil sample contained no iodine.

**Baroda:** In Baroda, village Tanakhla of Taluka Naswadi 100 km from the Baroda city but 8 km from Jharia of district Bharuch was selected. Thirty-five percent of the population here is made up of tribals. The sources of water supply are mostly unchlorinated wells. The prevalence of goitre was 32% in school-children (Table 8).

**Bharuch schools:** Bharuch (Pioneer High School, sample 200), and (R.S. Dala Govt. School, sample 256) showed goitre prevalence of 7.5% (13 in grade 1a and 2 in 1b) and 8.6% (18 in grade 1a, 3 in 1b and 1 in 2) respectively, in children of age groups 12-17 years.

**Water Pollution:** Prevalence of goitre was high in the villages of Bharuch district where water supply was scarce. People in the goitrous areas were drinking heavily polluted water from rivulets or shallow wells. The possibility of goitrogenic factors in polluted water has to be considered. Bacteriological analysis of water sources in these areas has shown heavy contamination. Chemical analysis also supports presence of nitrate which may indicate fecal pollution. The residual chlorine in the water was nil indicating either that these wells were not being chlorinated or that such chlorination was done very infrequently. Hence goitre prone areas should be included as priority areas for provision of safe drinking water supply under the National Water supply and sanitation



programme of the Government of India.

We suggest that: (1) All the villages on the bank of river Narmada be selected for goitre survey; (2) Analysis of water sample of the villages for chemical composition as well as bacteriology may be undertaken in the areas where goitre is common; (3) The inaccessible hill area of Junaraj, with inadequate transport facilities, may be provided iodised salt packets in bags of 2½ kg per family at a time for the next two years till better transport arrangements are made; (4) polluted water may be an important factor in goitre prevalence for this particular area. Drinking water may be carried to this area from the Karzan dam

area (4½ km distance) every morning by tankers (one) till some other permanent method for supply of safe drinking water is evolved. This may not only help control endemic goitre but also other nutritional losses due to gastrointestinal disorders; (5) Traders in the villages neighbouring the districts of Surat and Baroda must be supplied iodised salt by the civil supplies department at their doors. They also need constant surveillance in order that uniodised salt does not find entry in their shops; (6) The price of iodised salt in Baroda and Surat must be maintained lower than that of other common salt (uniodised) so that traders do not find it attractive to smuggle

**Table 8: Assessment of goitre prevalence in school children of Bharuch and adjoining villages of Baroda**  
(Survey undertaken in June and July 1982)

Place, age in years and no. of subjects	Goitre grades					Total number — 1190 Prevalence percentage
	1a	1b	2	3	4	
<b>Junaraj</b>						
6-12 yr (60)	25	18	3	—	—	70.23 with adenoma in one
13-17 yr (35)	10	13	2	—	—	
≥ 18 yr (32)	6	3	8	2	2	
<b>Jharia</b>						
6-12 yr (124)	44	35	6	1	—	62.3
≥ 18 yr (47)	2	2	3	1	—	
<b>Vagra</b>						
6-12 yr (175)	46	3	—	—	—	36.4
13-17 yr (165)	68	7	—	—	—	
<b>Bharuch</b>						
Proper school						
13-17 yr (456)	31	5	1	—	—	8.1
<b>Tanakhla</b>						
Baroda						
6-12 yr (103)	32	11	2	—	—	32.0
13-17 yr (147)	25	9	1	—	—	
<i>Number of children given in ( )</i>						



in other salts.

Gujarati communities are fully cooperative and progressive. So education rather than legislation is likely to yield rich dividends with regard to the promotion of iodised salt. In each village Mukhiya's house, battery-operated microphones are available. These can be effectively used for an educational programme.

### 2.3.5 West Bengal

Five districts in North West Bengal e.g. Malda, Darjeeling, Jalpaiguri, West Dinajpur and Cooch-Bihar are endemic for goitre. They receive iodised salt from Salt Gollah, Calcutta. In the year 1981 about 54% of the required iodised salt was supplied, up to September 1982 supply has been 69%. The figures for prevalence of goitre available from the State Health Directorate for 1977 are:

These figures must be an underestimate as it seems likely that they refer to grades 2 to 4 of the WHO classification, as ordinarily medical officers in the P.H.C. do not recognise 1a and 1b goitre grades.

Table 9—Goitre in North West Bengal		
District	Population (lacs)	Goitre cases reported
Malda	4.81	2378
Darjeeling	6.02	536
Jalpaiguri	17.59	924
West Dinajpur	18.47	2586
Cooch-Bihar	12.89	1439

### 2.3.6 Assam

The two iodisation plants installed two years ago are still lying idle. The Central Government had agreed to set up 3 more plants for iodisation at Tejpur, Nowgong and Joragong in the near future.

The total requirement of iodised salt is 1,32,000 M.T./annum. Survey work was done in Chaygaon P.H.C. of district Kamrup. The prevalence was 40.5% in 6-12 years and 10.4% in 13-15 years age group. In schools of villages Abhipara Bartari

and Simna, out of 139 children of 6-12 years age, prevalence was 70.5% (Table 11).

Table 10 —Reported numbers of cases of goitre in different areas of Assam.\*

Area	Population (lakhs)	1979	1980	1981
Nowgong	16.81		11,668	15,097
Dibrugarh	14.11	2459	2,793	3,349
Sibsagar	18.37		8,568	9,156
N.C. Hills	0.76		700	1,297

*\*Obtained from out-patient data from urban and rural health centres and probably refer to grades 2-4 cases who seek medical treatment.*



**Table 11: Assessment of goitre prevalence in school children  
Chaygaon P.H.C., district Kamrup, Assam**

*Total Number = 793*

Area	Age (years)	Sex	No.	Goitre grade					Total	Percentage prevalence
				1a	1b	2	3	4		
Gumi High School	13-15	M	183	10	6	4	0	0	20	10.92
		F	149	8	9	4	2	0	23	15.44
	6-12	M	152	11	6	0	0	0	17	11.18
		F	183	13	12	5	0	0	30	16.39
Simna L.P. School	7-10	M	58	6	23	6	2	0	36	67.72
		F	23	5	7	6	1	0	19	82.60
Abhipara Bartari L.P. School	5-9	M	23	4	12	5	0	0	21	91.13
		F	25	2	7	8	0	0	17	68.00

### 2.3.7 Nagaland

The total population is 7.8 lacs. Supply of Iodised salt as well as improved living conditions have controlled endemic goitre. The State is receiving its total supply of iodised salt at Dimapur and the salt is distributed through government nominees (presently Rs. 42/- per bag of 75 kg). It is proposed to set up an iodisation plant at

Dimapur.

A survey was conducted in a village near Kohima (10 km); the observations reveal that children 7-12 years of age, belonging to lower socio-economic group, may be still suffering from goitre, while well-nourished school children do not have goitre.

**Table 12 — Survey of school children for prevalence of goitre — Nagaland, Kohima village.**

Place	Age	Number	Sex	Goitre grade			Prevalence percentage
				1a	1b	2	
T.M. High School (upper SEG)	12-15	261	Both	5	3	0	3.26
P. Khel L.P. School	7-9	21	Both	5	1	1	33.3
		282		10	4	1	5.3



### 2.3.8 Manipur

Survey of goitre data (table 13) shows that 25.6% children suffer from early enlargement of thyroid goitre. The prevalence is more in the lower socio-economic group and in children between 13-16 years of age, (see figure 3)

Present requirement for iodised salt is 8,500 M.T./annum. This is supplied from Sambhar Lake, the supply coming from Dimapur through Kohima-Imphal road. It may be desirable to instal iodisation plants at Imphal or Mao.



Figure 3

*Cases of goitre in Imphal, Manipur*

**Table 13: Survey of goitre in school children in Manipur**

Area	Age (years)	Sex	No.	Goitre grade					Total	Percentage prevalence
				1a	1b	2	3	4		
Girls High School, Kongba	13-16	F	320	65	23	7	0	0	95	29.7
Bazar, Imphal (Middle SEG)	6-12	F	131	19	3	1	—	—	23	17.6
— do — (Poor SEG)	13-16	M	36	15	2	0	0	0	17	47.2
	6-12	M	108	29	3	0	0	0	32	29.6
Yaripok (Middle SEG)	13-16	M	39	15	1	0	0	0	16	38.5
		F	21	4	0	0	0	0	4	19.0
	6-12	M	177	23	0	0	0	0	23	13.0
		F	63	16	3	0	0	0	19	30.2
Total			895						229	25.6



### 2.3.9 Bihar (Champaran)

Survey report (Table 14) shows that goitre prevalence is 44-77%. We were told that villages near river Gandak have very high goitre prevalence. This high prevalence was mainly due to irregular supply of iodised salt (50% of the requirement)

and an apathetic State machinery. We were informed that people prefer fine white salt than the large muddy crystals of iodised salt; in fact the ignorance with regard to iodised salt is such that some villagers actually believed that the 'muddy salt' was responsible for leprosy!

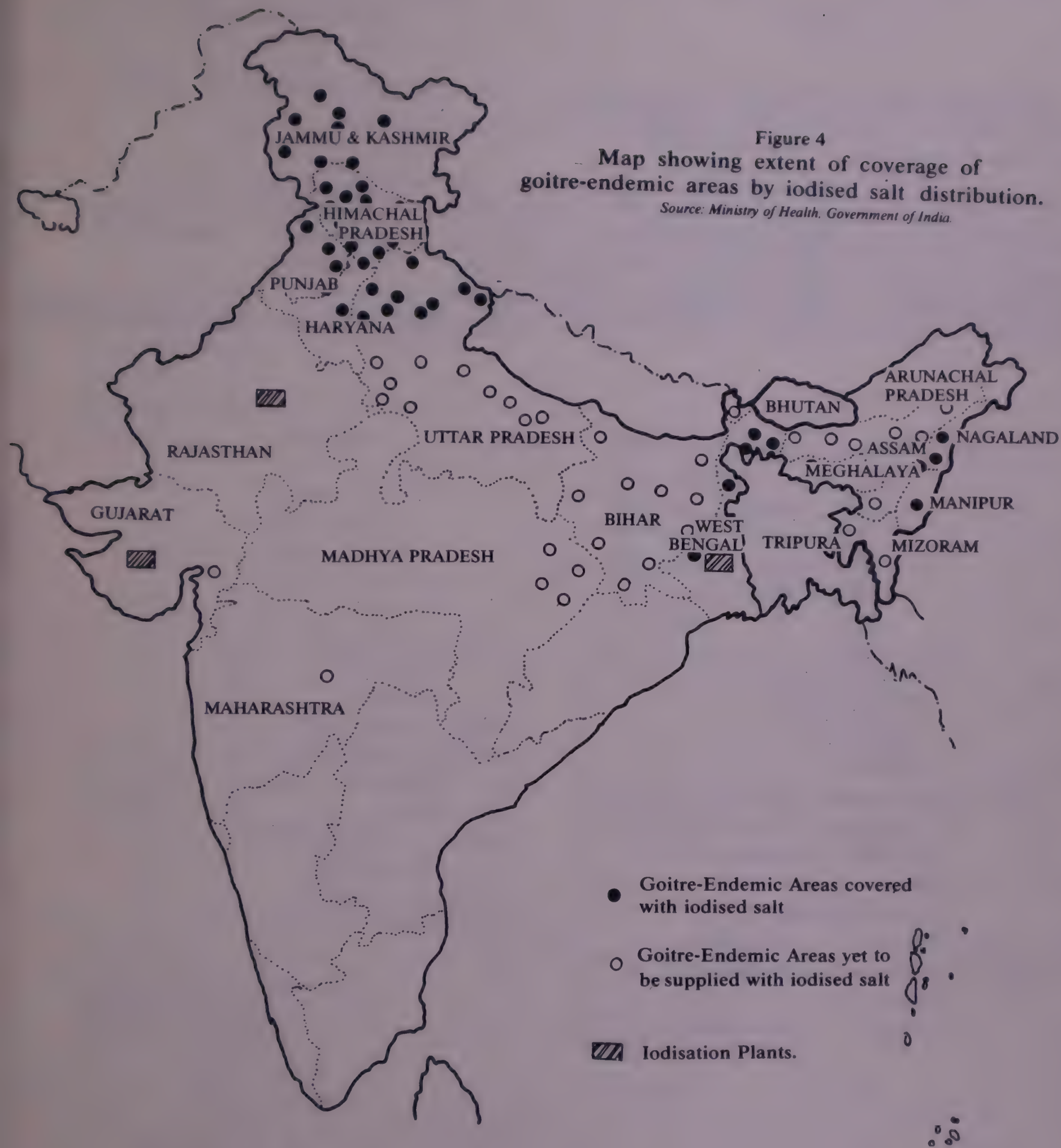
**Table 14: Prevalence of goitre in school children of Champaran, Bihar**

Area	Age (years)	Sex	No.	Goitre grade					Total	Percentage prevalence
				1a	1b	2	3	4		
Middle School Harpur Nag	8-14	Both	103	12	39	20	3	0	74	71.4
High School Chakia	13-21	M	82	18	12	6	0	0	36	44.0
Bal Niketan Kaneya Middle School, Motihari	8-14	Both	106	22	44	16	0	0	82	77.4
High School Lohatha, Motihari	13-21	Both	78	23	14	19	0	0	56	71.8
Total			369	75	109	61	3	0	248	67.2





**Figure 4**  
**Map showing extent of coverage of**  
**goitre-endemic areas by iodised salt distribution.**  
*Source: Ministry of Health, Government of India.*

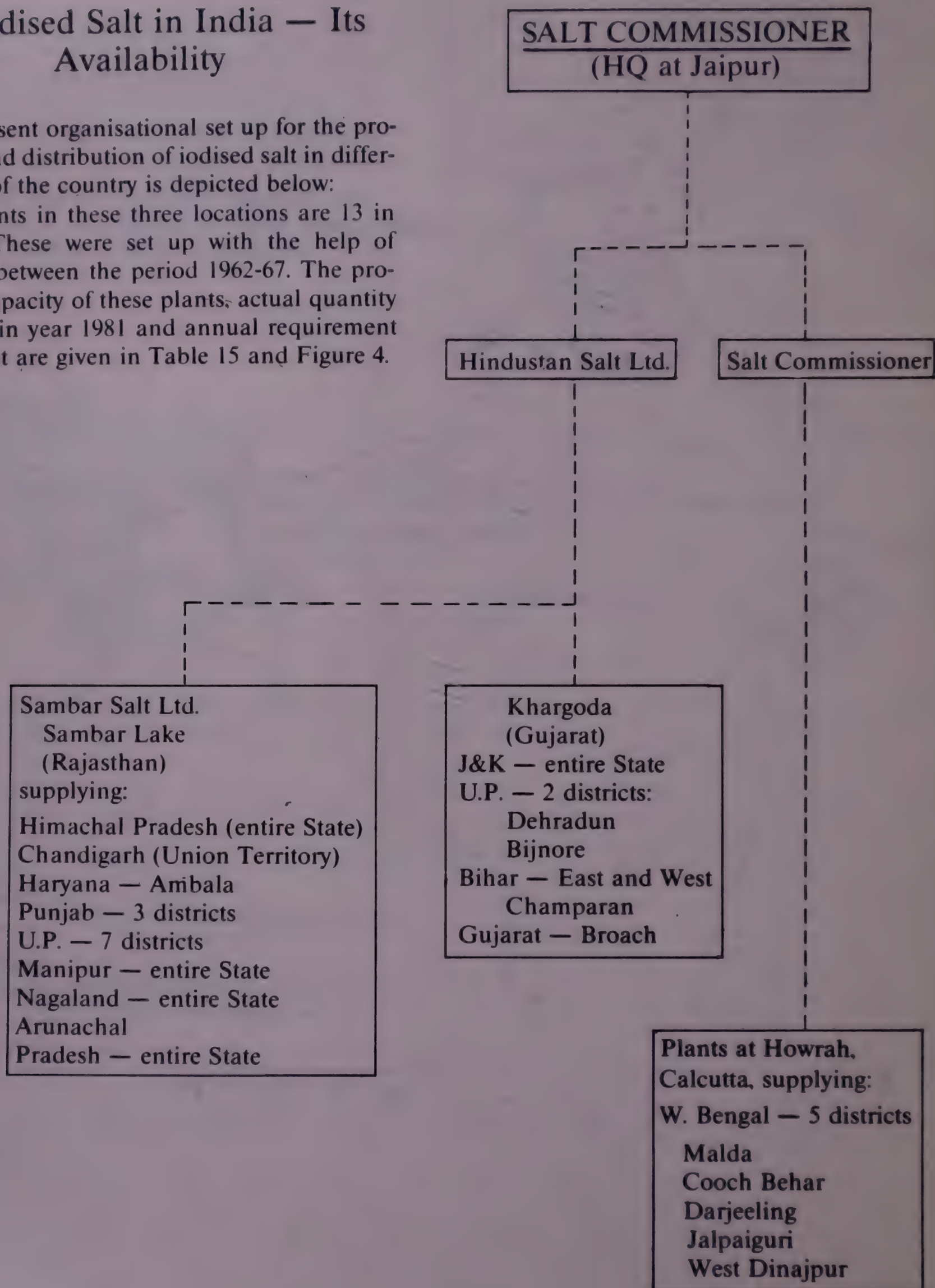




## 2.4 Iodised Salt in India — Its Availability

The present organisational set up for the production and distribution of iodised salt in different parts of the country is depicted below:

The plants in these three locations are 13 in number. These were set up with the help of UNICEF between the period 1962-67. The production capacity of these plants, actual quantity produced in year 1981 and annual requirement worked out are given in Table 15 and Figure 4.





**Table 15: Showing location and type of iodised plants, their production capacity with supply to different areas**

Location & Management	Type and number of plants	Production capacity (on 2 shift basis) (M-tonne/year)	Annual requirement of iodised salt in different areas with amount (M-tonne/year)	Quantity of salt iodised in 1981 (M-tonne/year)
Hindustan Salt Limited Sambhar Lake (Rajasthan)	Dry mixing — 2 Spray — 3 Pilot spray type — 1	1,85,400	Himachal Pradesh 24,000 Chandigarh 2,100 Ambala (Haryana) 8,000 Hosiarpur, Ropar and Gurdaspur (Punjab) 20,000 U.P. Districts — 9 23,000 Manipur 8,500 Nagaland 4,200 Arunachal Pradesh 13,700  Total 93,500	53,715.43
Kharagoda (Gujarat)	Spray — 3	1,15,200	Jammu & Kashmir 34,000 Bijnor & Dehradun 14,500 Bihar (Champaran) 30,000  78,500	47,702.75
Calcutta Salt Commissioner of India	Spray — 3 Pilot spray type — 1	76,000	West Bengal (Malda, Cooch-Behar, Darjeeling, West Dinajpur and Jalpaiguri 51,400	27,774.65
<b>Total</b>	<b>13</b>	<b>3,76,600</b>	<b>2,23,400</b>	<b>1,29,192.83</b>
(The data have been obtained from M/s. Hindustan Salt Limited and Salt Commissioner, Government of India, Jaipur, during our visit in June-July, 1982)			Production (in Metric Tonne) In 1980 = 1,22,818.18 In 1979 = 1,20,528.28	



While production units were thus established, physical distribution (and its two major sub-systems — transportation and warehousing) had apparently not been taken care of in advance for timely and economical supply of iodised salt. In some cases transportation was involved right from Kharagoda to J & K, and Sambhar to Arunachal Pradesh. To meet the full needs of endemic areas, it is understood that the Director General of Health Services (DGHS) proposes to set up 15 more plants in different parts of the country. Even after this expansion in the Sixth Plan, States like Uttar Pradesh with 7 uncovered districts having an enormous population, will remain untouched. In Himachal Pradesh, Nalagarh, District Solan has been inspected for an iodisation plant but this is perhaps not going to materialise during the Sixth Five-Year Plan period.

According to the Salt Commissioner, some private Indian firms are in a position to provide iodisation spray plants at relatively low cost. We may also accept and use the submersion process which is independent of power supply in areas of Uttar Pradesh, Bihar, Aurangabad (Maharashtra) and Madhya Pradesh, etc. Submersion and spray methods can be used anywhere; both the processes need covered areas, as heavy rainfall affects iodisation. In spite of additional cost for emptying and refilling of gunny bags, it is beneficial to iodise salt at the consuming end, irrespective of the methods used.

Research for stable and better methods for iodisation of salt suited for areas of North-Eastern States which have high humidity and rainfall also needs to be undertaken.

#### Estimates for existing potential to produce iodised salt in India\*

**Public Sector.** — In the public sector M/s. Hindustan Salts' claims regarding capability to produce iodised salt are indicated in table

**Table 16: Capacity at Sambhar Lakh and Kharagoda for iodisation in M.T. per annum**

Single shift working M. Tonnes	Double shift working M. Tonnes	Three shift working M. Tonne
1,39,200	2,78,400	4,17,600

Their total production in M. Tonnes of salt in the year 1980-81 was:

Sambhar Lake	= 2,24,445
Kharagoda	= 1,59,266
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	3,83,711 M. Tonnes
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*\*The estimates presented are based on the data available from M/s. Hindustan Salts Ltd., and the C.S.M.R.I., Bhavanagar.*

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Thus the total salt production and the capacity to iodise are nearly similar. The Government may instruct Hindustan Salts Limited to iodise their total produce as far as possible. They should, however, be asked to improve the quality of their salt so that the colour is acceptable.

The Salt Superintendent at Howrah informed us that four spray-type plants are working on single shift basis (expected production 36,000 M.T.); however, approximately only 28,000 M.T. annually are being iodised (1981 assessment). Salt for iodisation is received from Tuticorin (70% supplies) and from Gujarat, and importers pay 10% salt as Government levy. The Government nominees from the districts of Malda, Cooch-Bihar, Jalpaiguri, Darjeeling, West Dinajpur, entrust purchase and iodisation to some traders in Calcutta on Re. 1/- per bag commission basis. On an average the cost of uniodised bag of 75 kgs is cheaper by Rs. 3/-. The total iodised salt requirement of these five districts is 51,400 M.T./annum. Thus, the salt Gollah-Howrah iodisation plants are presently supplying 54% of the requirements. The remaining 46% is met by supplies of ordinary salt from neighbouring districts. The production of iodised salt is afflicted by three basic maladies: (1) Irregular and unreliable power supply; (2) Inadequate human resources — work is being carried out at present by 52 casual labourers @ Rs. 9.90 per day; (3) Plants at salt Gollah have outlived their economic life.

**Plants at Gauhati** — These plants are now installed in the main market (main bazar road). The position was really bleak as no iodisation work was undertaken till date.

The site chosen for shifting the iodised plants and possibly adding a few more, is located near



the meter gauge railway head, mainly used for army purposes. It was found that 30 acres of this low-lying and *marshy* land is being filled on contract basis of Rs. 11/cm<sup>2</sup> by several contractors. Assessment on site and discussions on the spot gave us the impression that this land will *always* remain moist. Therefore storage of salt in these godowns with dampness will deteriorate the quality and appearance of salt. Clearly, timely proper decisions with regard to location and working of the plants are called for.

**Private Sector** — The question of involving private manufacturers in setting up iodisation plants (spray type locally made or submersion process) in different parts of the country also requires consideration. However, in any such arrangement, specifications for iodisation, packaging, storage, transport, etc., should be strictly ensured. Quality control should be strictly monitored at manufacturing as well as consumer's ends.

Tata's salt has entered the market in the endemic areas. Since banning its entry in endemic areas may be difficult, the manufacturer may be provided potassium iodate at subsidised rates so that part of their total production destined for endemic zones is iodised. This is a suggestion worth considering.

During our discussion with M/s. Hindustan Salt Limited as well as with the Salt Commissioner of India, we found that they were not happy

with the proposal of entrusting the private sector with opportunities to produce iodised salt. Repeatedly the question of quality control was raised by them. The objection does not appear valid — the Salt Commissioner can maintain the check on iodine level at the production site, while State Health Authorities and DGHS can control iodine levels at the consumer's end. In any case, the position with regard to quality control at present, with the entire operation in the hands of the public sector, is by no means rosy. There would seem to be a reasonable case for involving at least some of the reputed private manufacturers in the manufacture of iodised salt either alone, or in collaboration with the public sector (as a joint-sector operation).

**Transport** — The railways are allotting wagons on priority to HSL for transport of iodised salt; unfortunately 50% of these are open wagons especially during summer and winter months. Since sunlight, rain showers as well as dew will deteriorate quality of iodine content, it is recommended that railways be requested to provide closed wagons until iodisation plants are set up in the endemic areas for meeting the local needs.

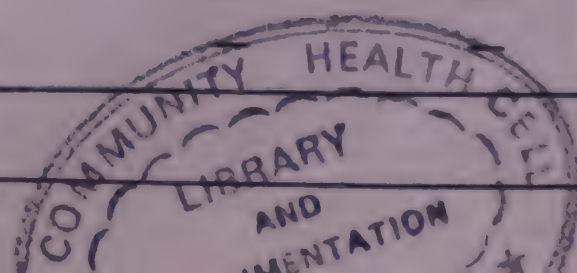
The observations on eight bags collected by the Hindustan Salts Limited (HSL) show that storage must be ensured in well covered godowns (Table 17). At the National Institute of Nutrition, Hyderabad, it was found that on storage at room temperature potassium iodate (KIO<sub>3</sub>) in four

**Table 17 — Showing percentage loss to KIO<sub>3</sub> in different storage conditions\*.**

Days of storage	Open area (%)	Rain (mm)	Covered area (%)	Rain (mm)	Only top covered (%)	Rain (mm)
0	KIO <sub>3</sub> = 27.2 ppm					
9	2.9	—	3.3	—	2.9	—
17	2.8	—	4.4	—	5.2	—
27	19.1	153	3.8	—	6.3	—
34	24.7	181	5.1	—	6.9	—
44	42.8	241	5.1	—	6.9	—
55	53.9	327	5.7	—	16.4	434
68	—	—	7.8	—	—	—
78	—	—	7.2	—	—	—

\*Source M/s. Hindustan Salt Ltd., Jaipur.

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months loses 8.9% of iodine, while calcium iodate  $\text{Ca}(\text{IO}_3)_2$  loss is only 1.0%. Calcium iodate is proposed to be used in submersion process, developed by the Central Salt Marine Chemical Research Institute, Bhavnagar.

Iodised salt in stitched plastic bags at room temperature in tropics were found to retain upto 75% of iodine for three months. However, in jute bags loss of iodine in nine months could be as high as 90%. We, therefore, recommend that iodised salt should be packaged in jute (hessian) bags provided *with a good polythene lining*. The bags may also be provided with loops at the top to avoid tears while being lifted by steel hooks.

**Effect of humidity** — We reproduce here the opinion of Mr. R.R. Bhatt of the Bhavanagar Salt Research Institute — “Common salt has got about 5.5% moisture retention capacity. If moisture exceeds 5.5% draining starts and iodine can drain off. If iodination is carried out using rain washed salt then moisture does not exceed 5.5% even with maximum humidity. But if impure and unwashed salt containing high magnesium chloride is used then it absorbs moisture from the atmosphere as magnesium chloride is hygroscopic in nature. Magnesium chloride has got more than 50% as water of crystallization. If the total moisture exceeds 5.5% draining starts and iodine can drain off. As far as submersion method is concerned, this problem may not be there because during submersion washing also takes place and magnesium salts are washed away. This problem may not occur in Sambhar iodised salt because Sambhar salt does not contain magnesium. This can only be possible if unwashed Kharagoda salt is used because it contains higher magnesium than sea salt”

**Cooking** — The iodised salt should not be washed before use, otherwise all the iodine will get washed away. The practice of washing before use was observed by us in Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

**Legislation** — Under the Prevention of Food Adulteration Act (PFA) the sodium chloride content in the iodised salt has been prescribed at 96%, in contrast to 94% level in uniodised edible salt. The objective of this level of purity may be for reducing impurities in salt. Our country is producing three types of salt. The best with white appearance is ‘RESHTA’ and fetches better price

by Rs. 20-25/ton extra. However, for iodisation HSL is using PAN or KYAR salts. Since the appearance of salt is an important factor, NaCl 96% purity level must be maintained and better quality salt with white appearance be iodised. This will attract the consumer to select the iodised salt in contrast to uniodised salt with 94% NaCl level and little more impurities.

Technically, no fixed specification can be possible for iodised salt because iodine content varies with storage, rainfall, humidity changes. Even the samples collected from the same bag from top, middle and bottom will have wide variation in the analysis.

The National Goitre Control Programme has apparently never been thought of in proper perspective. Although goitre is a disease which can cause dire consequences, like mental retardation, and though its control is relatively easy, yet the whole machinery for the control of this disease has been slackening.

When we review the programme over the last twenty years, we find that we have still not mapped out all the areas of the country which are goitre-endemic; new endemic areas (U.T. Delhi) are being sporadically identified. In areas already identified as endemic, there is a lag period of 5-10 years before iodised salt supply starts. There is also no proper resurvey or surveillance in order to see how the disease is behaving.

People in the endemic areas have no knowledge as to the cause and consequences of the disease and the remedial measure proposed for it. Hence there is no public demand and the supply of iodised salt is therefore erratic.

Uniodised salt available from private manufacturers is cheaper than the iodised salt supplied by Hindustan Salts Limited (in spite of the fact that the entire cost of iodation is absorbed by the Government). The poor people go by the cost and so they prefer the less expensive uniodised salt of the private manufacturer. The rich go by quality and appearance and prefer Tata's salt. So iodised salt fails to make the grade on both counts of cost and quality.

Supply of food items falls within the purview of the Civil Supplies Department. If the State Health Department and Civil Supplies Department are both unconcerned, the programme is naturally bound to fail. This is precisely what has happened.



# **3. THE NATIONAL GOITRE CONTROL PROGRAMME — A SAD STORY**

**By**

**C. Gopalan**

**Reprinted from the July issue of the Bulletin of  
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# The National Goitre Control Programme — A Sad Story

It has been estimated that, today, about 40 million people in our country are suffering from goitre. A large number of these are cretins, who are mentally and physically retarded. Goitre is not just a 'cosmetic' problem but a disease which impairs health and productivity.

The endemic goitre belt in our country stretches across the entire sub-Himalayan region and includes the state of Jammu and Kashmir, Himachal Pradesh, Punjab (three districts), Haryana (one district), Bihar (nine districts), Uttar Pradesh (14 districts), West Bengal (five districts), Sikkim, Assam, Mizoram, Meghalaya, Tripura, Manipur, Nagaland and Arunachal Pradesh. Endemic goitre has also been identified in the Aurangabad district of Maharashtra and the Shahdol and Siddhi districts of Madhya Pradesh. The prevalence of goitre in these endemic areas ranges from three percent to 60 percent with an estimated average prevalence of 30 percent.

## The Programme

The causative factor underlying goitre was identified long ago as iodine deficiency. Prevention and control of goitre, through distribution of iodised salt, is well known and goitre was totally eradicated from the developed countries several decades ago through the application of this technology. The story in our country unfortunately, has been different.

The National Goitre Control Programme, financed by the Ministry of Health and Family Planning, was launched by the Government of India towards the end of the Second Five Year Plan and had three main components:

- Survey of goitre in suspected areas to identify and assess its prevalence.
- Production and supply of iodised salt to endemic areas to prevent and control goitre.
- Resurvey after five years of continuous supply of iodised salt, to assess the impact of the Programme.

Two goitre survey teams, appointed by the Health Ministry, carried out initial surveys in almost the entire sub-Himalayan region and in

certain areas of the central plateau of the country.

Twelve salt iodisation plants have been set up by the UNICEF since 1959, for the purpose of manufacturing iodised salt to be distributed in the endemic areas with two more being installed, with UNICEF's support, in Gauhati, to serve the needs of the Goalpara and Kamrup districts of Assam and the adjoining state of Meghalaya. The potassium iodate for iodisation is being produced by Hindustan Salts Limited.

The Programme has had a chequered history. Administrative incompetence, lack of coordination between various agencies involved, and commercial and vested interests, have apparently combined to wreck the Programme.

The Programme was envisaged to cover only a part of the entire goitre belt. The requirement of iodised salt needed to cover even this area "could not be met even to the extent of 50 percent due to inadequate production and other bottlenecks in the distribution system...Under the circumstances the initial surveys and resurveys have lost their relevance."

The figures, supplied by the Health Ministry, indicate the current state of affairs regarding production of iodised salt. (Table 1 overleaf).

## Inadequate Facilities

The Health Ministry blames the Salt Commissioner and Hindustan Salts Limited for inadequate production resulting from underutilisation of installed capacity. On the other hand, the Salt Commissioner has proposed the installation of six more iodisation plants.

While the actual production of iodised salt is inadequate, its transportation has suffered because of nonavailability of the required number of railway wagons. The present position reads as follows:

"The iodisation units have been facing extreme difficulties in getting the allotment of the required number of railway wagons. The problem of getting covered wagons in the rainy season has not been solved by the railway authorities.

The following factors are considered responsi-



✓ ble for the failure of the Programme:

- The Programme has not been properly supervised and evaluated at the state level due to absence of goitre cells in the state health directorates of the endemic states/union territories.

- The district civil supply authorities have not exercised district control over the salt nominees, resulting in poor supply of gunny bags and poor lifting of iodised salt by these nominees. There has been no coordination between the state health departments and the civil supply departments.

- The Prevention of Food Adulteration Act (PFA) has not been enforced by the state health departments, resulting in the entry of noniodised (common) salt in the endemic areas under the purview of the Programme. Non-enforcement of the Act during a shortage of iodised salt is valid else there will be an overall scarcity of salt.

- There has been unsatisfactory and uncertain help and cooperation extended by the endemic states during surveys, in terms of allocation of transport facilities and services of a medical officer to supervise the survey work in the blocks.

- Often the ban notification, a prerequisite to the supply of iodised salt, has been unnecessarily held up.

Under the circumstances, the National Goitre Control Programme, in operation for nearly 20 years, has failed to make a significant impact in many areas as revealed by the data (Table 2).

The failure of the National Goitre Control Programme highlights the current state of affairs with regard to the implementation of health programmes (including centrally sponsored programmes) in the country. Earlier issues of the *NFI Bulletin* had pointed out the unsatisfactory manner in which the Vitamin A Deficiency (nutri-

tional blindness) Prevention Programme was being implemented. 'Goitre and similar health and nutritional problems are diseases of the poor and underprivileged and, therefore, apparently looked upon as their problem not ours'.

The situation regarding the National Leprosy Control Programme and the Tuberculosis Control Programme has been similar.

### Qualitative Change Needed

What is needed is a qualitative change in the approach to these problems. There must be a greater awareness of the importance and urgency of these problems and high priority must be accorded to their control and prevention. A basic prerequisite for national development is the improvement of the quality of human resources.

Better coordination between the central and state health agencies for implementing centrally sponsored health programmes is essential. Separate and specific institutional arrangements must be made for each programme, job responsibilities at different levels clearly delineated, and specific time bound targets laid down.

There must be periodic independent monitoring and evaluation of each programme with achievements and shortcomings audited and highlighted. Responsibilities for lapses, if any, should be fixed ensuring due accountability in the execution of these programmes. There should also be a system of rewards for outstanding achievement and punishment for dereliction of duty respectively.

Unless health, nutrition and welfare programmes are executed in all seriousness, with a sense of urgency and dedication, the present drift will continue.



Impact of the Programme					
District/ State	Baseline survey year	Prevalence percentage rate	Commencement of salt supply	Resurvey year	Prevalence percentage rate
<b>HIMACHAL PRADESH</b>					
Sirmoor	1959	35.8	1963	1980	28.07
Kangra	1956	41.2	1962	1962	32.10
<b>PUNJAB</b>					
Gurdaspur	1961	52.3	1964	1969	42.30
Hoshiarpur	1961	40.3	1964	1969	23.60
Chandigarh	1969	11.2	1968	1977	45.90
<b>BIHAR</b>					
Champaran (East and West)	1960	40.3	1964	1979	64.51 East 57.20 West
<b>WEST BENGAL</b>					
Darjeeling	1965	34.5	1967	1975-76	35.58
<b>UTTAR PRADESH</b>					
Dehra Dun	1965	39.7	1966	1969	16.90
Bijnore	1960	23.2	1960	1969	23.60

Production of Iodised Salt		
Total annual requirement of iodised salt	700,000	MT
Total installed capacity of 12 iodisation plants already set up	376,000	MT
Total annual quota fixed for production for use in India	220,000	MT
Production quota in the Sambhar Lake and Khargoda area for supply to Nepal	60,000	MT
Total actual production for both India and Nepal together in 1974-75	122,000	MT
in 1978-79	106,000	MT











